...NT, APRIL 20, 1933. REG. AT THE G.P.O. AS A NEWSPAPER.

FIRST AERO WEEKLY IN THE WORLD

MAY 1 1933

Engin... Library

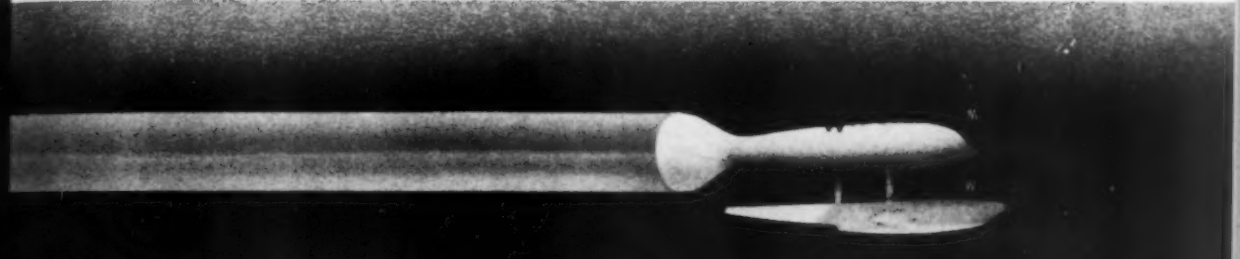
FLIGHT

The AIRCRAFT ENGINEER AND AIRSHIPS

OFFICIAL ORGAN OF THE ROYAL AERO CLUB

No. 1269
Vol. XXV
No. 16

SIXPENCE
EVERY THURSDAY

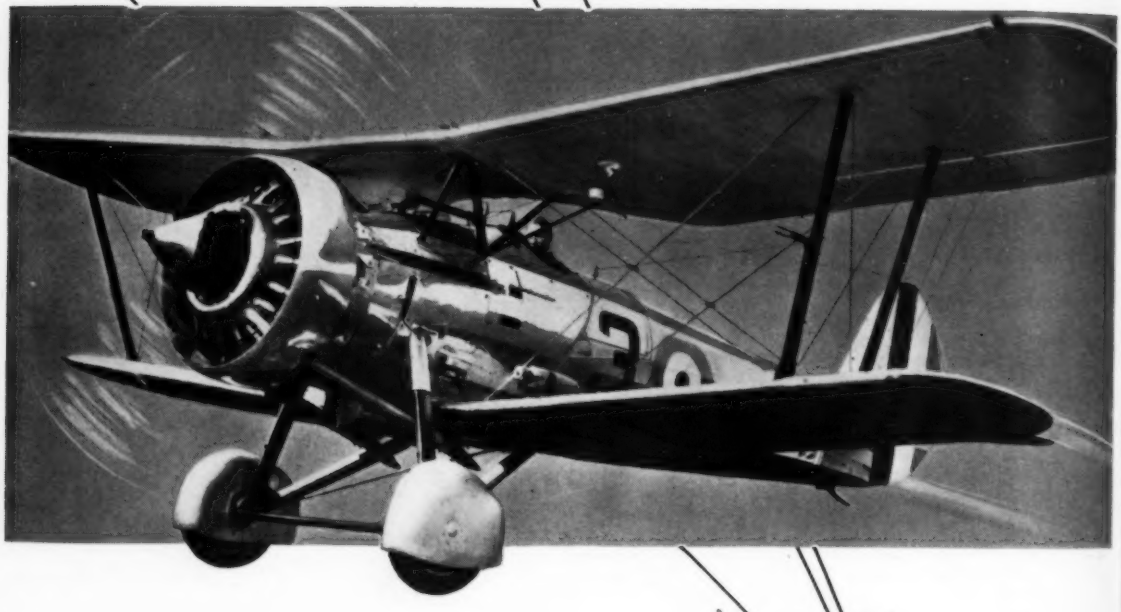


423
M·P·H
FASTEST SPEED EVER!
USING
WAKEFIELD
Castrol
MOTOR OIL

The World's Air Speed Record was broken on April 10th *(subject to official confirmation)* at Lake Garda, by a Macchi-Castoldi 72 Seaplane piloted by Warrant Officer Francesco Agello. The Fiat engine was lubricated with Castrol, as chosen by Sir Malcolm Campbell for his Rolls-Royce engine in breaking the Land Speed Record at 272 m.p.h.

C. C. Wakefield & Co. Ltd. (ALL BRITISH) Wakefield House, Cheapside, London E.C.2

RELIABILITY IN SERVICE



"BRISTOL" design is studied to secure the maximum reliability under searching conditions of service, combined with ease and simplicity of maintenance and repair. Operators of "Bristol" steel aircraft testify as to the trouble-free service over lengthy periods secured with "Bristol" machines, ensuring very real economy in operation.

"Bristol"

THE BRISTOL AEROPLANE CO., LTD. — FILTON, BRISTOL

Telegrams :—Aviation, Bristol. *Telephone :—45051 Bristol.*

Kindly mention "Flight" when corresponding with advertisers.

FLIGHT

The AIRCRAFT ENGINEER AND AIRSHIPS

First Aeronautical Weekly in the World. Founded January, 1909

Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice and Progress of Aerial Locomotion and Transport

OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM

No. 1369. (Vol. XXV. No. 16.) 25th Year. APRIL 20, 1933 Weekly, Price 6d. Post Free, 7½d. Abroad, 8d.

Editorial Offices: 36, GREAT QUEEN STREET, KINGSWAY W.C.2.
Telephone: (2 lines). Holborn 3211 and 1884.
Telegrams: Truditur, Westcent, London.

Subscription Rates, Post Free.

United Kingdom		United States		Other Countries	
	s. d.				s. d.
3 Months ..	8 3	3 Months ..	$2·20	3 Months ..	8 9
6 " ..	16 6	6 " ..	$4·40	6 " ..	17 6
12 " ..	33 0	12 " ..	$8·75	12 " ..	35 0

CONTENTS

	PAGE
Editorial Comment:	
Italy's Speed Record	365
The S.B.A.C. Display	366
The Macchi Monoplane and its Fiat Engine	367
Beauties and Advantages of Air Travel	368
De Havilland "Leopard Moth"	370
"Air-Minding" the Public	371
Air Transport: The G.W.R. Air Service	373
Lessons of the Do.X: By Dr. C. Dornier	374
Airspeed "Courier"	379
From the Clubs	381
Airport News	382
Italy Beats the Speed Record	383
Airisms from the Four Winds	384
Royal Air Force	385
Air Service Training Activities	386

DIARY OF CURRENT AND FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in this list:—

1933.
Apr. 27. "Seaplane Research," Lecture by H. M. Garner before R.Ae.S.
Apr. 28. Junior Ae.C. Dinner to Sqd. Ldr. Gayford and Flt.-Lt. Nicholetts.
Apr. 28. A.I.D. Technical Staff Association Annual Dinner, Holborn Restaurant.
Apr. 29. No. 34 Sqdn. Reunion Dinner, Ship Restaurant, Whitehall.
May 1. Entries close at ordinary fee for King's Cup Race.
May 5. Oxford University Air Sqdn. Dinner, Clarendon Hotel, Oxford.
May 5. Opening of Inverness Municipal Airport.
May 16-22. International Rally, Vienna.
May 19. Entries close at double fee for King's Cup Race.
May 20. G.A.P.A.N. Annual Civil Air Display, Brooklands.
May 20. Opening of R.A.F. Rifle Association's Meeting at Bisley.
May 20-22. Scottish Flying Club Annual Display, Renfrew.
May 25. Tourist Rally at Wiesbaden.
May 27. Reading Ae.C. Annual "At Home."
May 28. Deutsch de la Meurthe Cup, Etampes.
May 30. Wilbur Wright Memorial Lecture before R.Ae.S.
June 5. "Morning Post" Race, Heston.
June 5. Lincs. Ae.C. Air Pageant and Opening of Aerodrome at Holton-le-Clay, Grimsby.
June 5. Skegness Flying Meeting.
June 5. Northamptonshire Ae.C. Annual Air Pageant.
June 7. Household Brigade Flying Club Meeting.
June 10. Henly's Rally, Heston.
June 11. International Meeting, Brussels.
June 15-18. Aero Club of France Tourist 'Plane Meeting.
June 16. Mayor's Aerial Garden Party, Eastbourne.
June 17. Bristol Airport Flying Meeting.
June 17. Charity Air Display at Maidstone Airport.
June 21. Official Opening of Norwich Municipal Airport by H.R.H. the Prince of Wales.
June 24. Royal Air Force Display, Hendon.
July 1. Merseyside Aviation Display and Opening of Speke Aerodrome, Liverpool.
July 1-4. U.S. National Air Races, Los Angeles Airport.
July 2. 12-Hour Contest of Distance, Angers.
July 8. King's Cup Air Race, Hatfield.

EDITORIAL COMMENT

WE beg to offer our very heartiest congratulations to the Italian Royal Air Force and their High Speed Flight on having achieved the World's High Speed Record in the air. We are particularly pleased that the successful pilot was one of the splendid team which visited Great Britain to challenge us in the Schneider contest of 1929 at Calshot. Sergente (as he then was) Francesco Agello was a very quiet man, but he was evidently a very hard worker, and his nerves did not seem to have been in the least upset by having survived two nasty crashes not long before. In the actual contest he was spare man for the Italian team, as Flt. Lt. Stainforth was for our team, and it is a curious coincidence that both those spare men have since then established world's speed records. Our High Speed Flight was dissolved soon after each contest was concluded; but the Italian Flight has continued its daring existence, determined to break the speed record whatever the cost. Two of the pilots who took part in the 1929 contest, Warrant Officer Dal Molin and Capt. Monte, as well as some others, have in the meantime given their lives in the attempt to set up this new record. Of the third competing pilot, Lt. (or Tenente) Remo Cadringher, we have not heard since the race. His achievement in taking off, in the navigability trials, a machine which had not previously flown, and attempting to race it next day, was ample proof of his skill and hardihood.

Italy's Speed Record

Tenacious courage in the face of repeated difficulties and losses has been the characteristic of the Italian High Speed Flight, and these are qualities which appeal to all British sportsmen. We must also admire the ingenuity of the Italian aeroplane designers, who have tried many unorthodox methods of trying to increase the speed of their seaplanes. Those devices were not immediately successful, but at last success has come to the novel arrangement of the Fiat engines in the Macchi machine, of which photographs are published on another page. This machine may be just a racing "freak," and may make no contribution to the future design of either

military or commercial aircraft, but we should never be inclined to despise original ideas which are intended to produce a certain result and which ultimately do actually achieve what they were meant to do.

The British record set up by Stainforth has stood for some 18 months, and we may feel proud of that fact. It would not have needed a soothsayer to foretell that, when we had dispersed our High Speed Flight and the Italians had maintained theirs, sooner or later they must succeed in beating our record. We may add that, as it was a certainty that our record could not stand for ever without further effort on our part, there was no nation to whom we would more willingly see it go than to our old sporting rivals of the Italian Royal Air Force. It is in no captious spirit, and in no desire to belittle the fine feat of Agello, that we mention that Stainforth's record and Agello's are not quite comparable, because they were flown in different conditions. The British flight was made in a machine which had been designed to fly the 350 kilometres of the Schneider course and to carry enough petrol, oil, and water for that course. From such a machine one could not expect such a high ultimate speed as from one designed solely to fly 3½ kilometres four or five times. This record-breaking Macchi was not obliged to undergo the navigability tests of taking off and landing, followed by hours of mooring out to ensure that the floats had not been sprung. The Macchi designer was left free to design for speed and for speed alone, and, naturally, this gave him a great advantage. Italy has thought it worth while to undertake this task, while Great Britain has not. Perhaps some day we shall be able to afford such luxuries, and then we shall be only too delighted to have another friendly bout with Italy. Meantime, we repeat our warm congratulations to General Balbo, the Italian Royal Air Force, and to Warrant Officer Agello.

❖ ❖ ❖

The S.B.A.C. Display

Some years ago the Air Ministry sanctioned a visit by Press representatives to the works of an approved aircraft firm to see a new type of aeroplane which had just been produced. The representatives of the firm distributed typed pages which gave a very little information about the machine, and then remarked, "That is all that we are allowed to tell the British Press. If you want to learn any more you will find it all in such-and-such an issue of such-and-such a paper" (naming a well-known foreign aeronautical review).

That seems to give in a nutshell the effects of the Government's secrecy regulations. We write "Government," but of course the Department with which we are concerned is the Air Ministry, which is not more fatuous than any other Government Department, but probably compares very favourably with some others. The foreign Press always, or shall we say usually, knows all about our latest types of aeroplane, while the British Press is forbidden to tell the British public more than a minimum of what it knows. FLIGHT has always prided itself on the rigid, sometimes the self-denying, manner in which it has observed all the rules which exist regarding secrecy and publication. It is, we hold a merit to obey rules; but observance of rules does not necessarily make those rules sensible. It should be remembered that unnecessary rules create crime. The object of all official secrets must be to prevent information which may be of use to an enemy from coming to the knowledge of a possible enemy. The term "possible enemy" must be held to include all foreign nations, however friendly our relations with them may be. Rules should be framed with that object, and should be interpreted by individual officials in the spirit of that object. When a piece of information is available for foreign attachés at Embassies in London, there can be no conceivable reason for withholding it from the British Press and the British public.

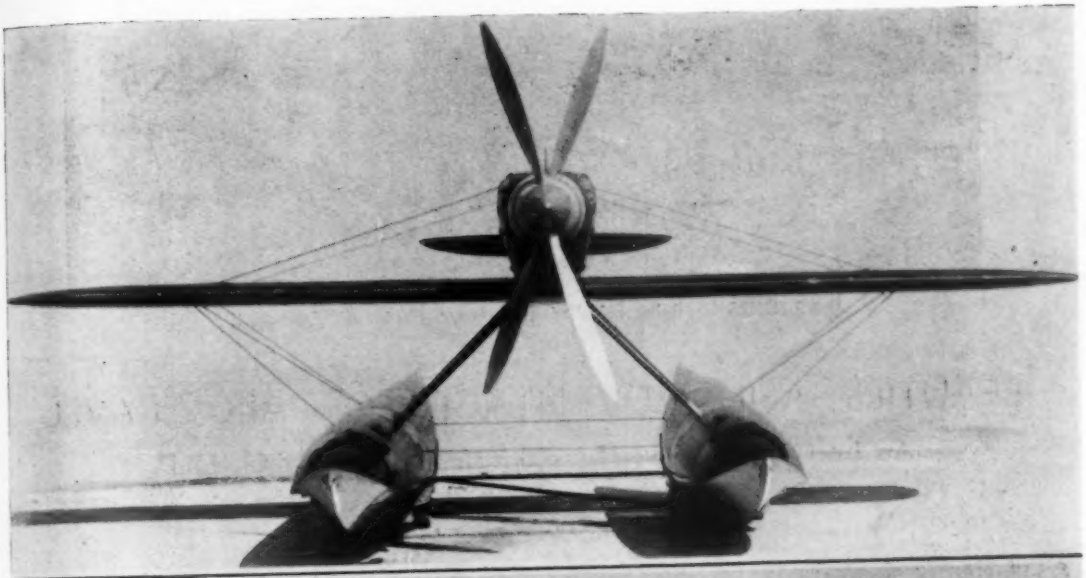
Trade secrets are on quite a different footing. Firms naturally wish to prevent their trade secrets from coming to the knowledge of their trade rivals, whether British or foreign. It is a plain duty of the Air Ministry to assist them in that object whenever a firm has disclosed a trade secret to the Ministry. What the trade is willing to make public it can be no concern of the Government to keep from the knowledge of the public, provided that the item would not be of use to a possible enemy.

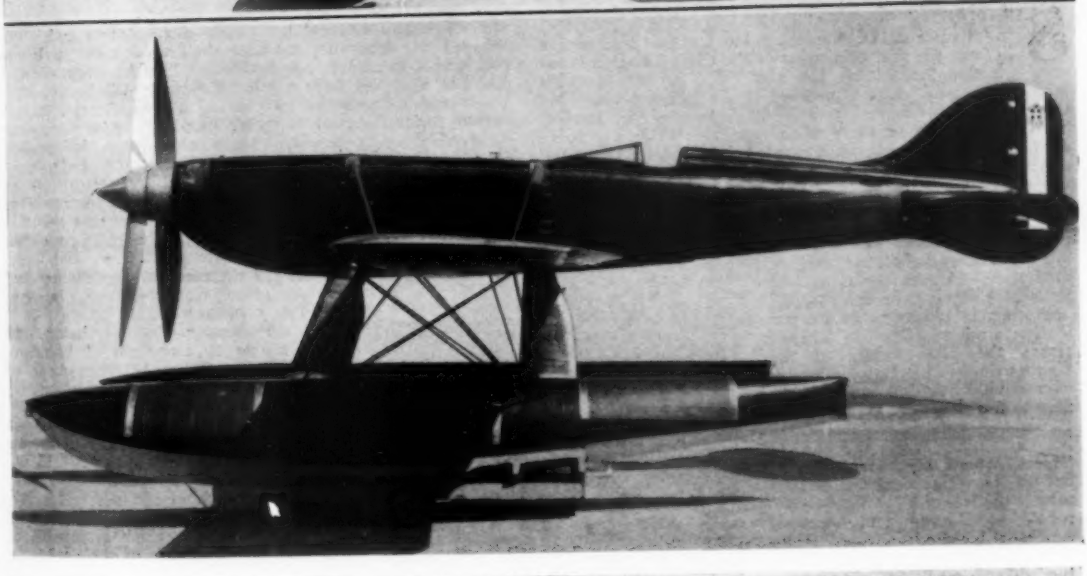
These reflections are prompted by the announcement that the Society of British Aircraft Constructors proposes to hold another private display of aircraft at Hendon shortly after the Royal Air Force Display on June 24 next. This is following the precedent of last year, when a very excellent exhibition of aircraft was held by the S.B.A.C. On that occasion all the foreign Air Attachés in London, and other foreign visitors who had come to London to see the great show put up by the R.A.F., were invited. We believe that very good business was done in consequence. Our exports of aircraft, aero engines and accessories have now reached a volume which must be quite gratifying to the Chancellor of the Exchequer, and everything which helps to increase that volume is heartily to be commended. Aircraft exports may in time play their part in reducing the income tax, and in the meantime they help to keep the pot of a vital national industry a-boiling when orders from the Government are delayed through the fondness of certain politicians for the amenities of life at Geneva.

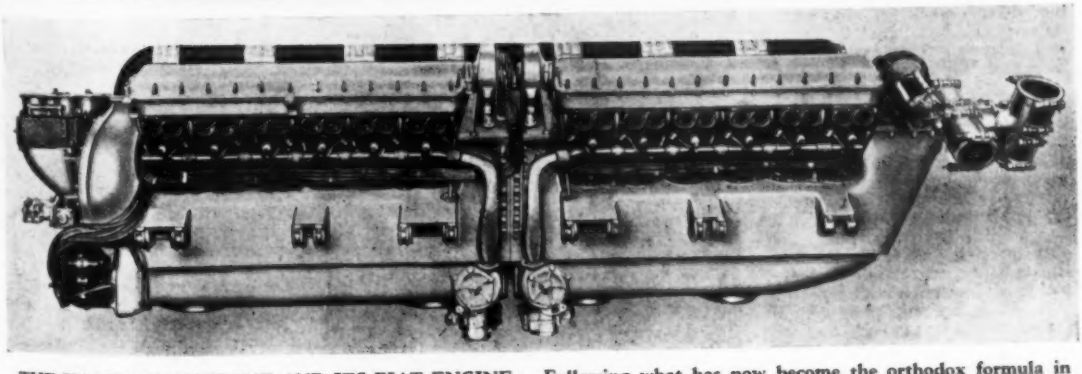
Last year, however, the S.B.A.C. made a mistake which, though in itself it may seem trivial, was in principle a very grave mistake. They forbade Press photographers to attend their Display, although all the foreign visitors were invited to make a close inspection of all the machines present. Why, we ask, should the British public be denied information which was almost pressed upon all our "possible enemies"? To make such a distinction is to strike at the roots of the principle on which all official secrecy is based. The greater the interest which the British public can be induced to take in British aircraft the better—provided only that they are not told what should be kept secret from a possible Marie Louise. When everyone knows that the foreign Governments have been told all about it, then—but it is surely superfluous to rub the principle in any more. We hope that the S.B.A.C. will not make the same mistake again.

卐 卐 卐 卐 卐

424 M.P.H.







THE MACCHI MONOPLANE AND ITS FIAT ENGINE : Following what has now become the orthodox formula in the design of high-speed seaplanes, the Macchi flown by Agello is the logical machine to build around the Fiat tandem engine. This consists of two engines joined together end-to-end, the airscrew shaft from the rear engine lying in the vee between the front cylinders. The airscrews rotate in opposite directions. (See page 383.)

"ARTEMIS": Being refuelled at Lyons. (*Photo, W. J. Makin.*)

BEAUTIES AND ADVANTAGES OF AIR TRAVEL

An Interview with Sir Harry Brittain, K.B.E., C.M.G., LL.D.

"Can distance separate the hearts of men once bound by ties of friendship?"

SIR HARRY BRITTAIN, K.B.E., C.M.G., LL.D., a director of D. Napier & Son for the past twelve years, the first Chairman of the Civil Aviation Committee formed by the London Chamber of Commerce, for many years a member of the Parliamentary Air Committee, who represented Great Britain on the subject of Air Transport at more than one international conference, and who has been interested in aviation since the earliest pioneer days, has just returned from a flight to the Cape and back. Leaving England on February 6 in the Imperial Airways machine *Artemis*, Sir Harry Brittain was back in England on March 27. During this comparatively short period he flew some 16,000 miles, through fair weather and foul, suffering neither hardship, harm, nor hindrance. Across the Continent to Naples, then over the sea and the rugged mountains of Corsica to the fair isle of Malta. Thence across the blue waters of the Mediterranean to Italian Libya, over Benghazi and Tobruk, and so across the Nile Delta to Cairo. Down the winding ribbon of the Nile to Assiut, across the Nubian Desert, where black rocks rising out of burning sands cause the most unpleasant vertical currents, to Luxor and Assuan. Across a hundred miles of rocky mountains to Wadi Halfa. Over the desert track of Kitchener's railway to Abu Hammed, and so to Khartoum, the junction of the Blue and White Nile. On southward, still following the Nile's narrow shining waters, through the southern Sudan to Kisumu on Lake Victoria, whose vast expanse of inland water is 3,700 feet above sea level. Southward again through Nairobi and Uganda, past the lofty peak of Kilimanjaro in Tanganyika Territory, and then over the rich and fertile lands of Rhodesia to the mountains and plains of South Africa.

Sir Harry Brittain pays a glowing tribute to the work and organisation of Imperial Airways on this 16,000-mile air route. Every landing and take-off on this journey was carried out by a master hand. The time schedule was religiously adhered to. Even when storms and winds delayed the machine, the lost time was made up before the next destination was reached. The Atalanta class of machine is delightfully comfortable in which to fly, cool, quiet, and conversation can be carried on in practically a normal voice. At all stopping places, even in places far removed from civilisation, the arrangements for passengers' comforts are admirable; comfortable beds, clean sheets, good well-cooked food, tastefully served up on white tablecloths. The tables on all occasions are even decorated with flowers, a small item, but one that bespeaks thoroughness and exactitude even to the smallest detail. The pilots and all officials, even in great heat, and under trying conditions, are always the essence of politeness and only too willing to assist in every way possible.

Mr. J. N. Caspareuthus and Sir Harry Brittain. (*Photo, W. J. Makin.*)

Passengers by air have been known to complain of boredom, but Sir Harry Brittain questions the soundness of a mentality capable of boredom during flying. A five-hour stretch is the longest a passenger experiences in the air without coming to earth. In the eleven days' trip to the Cape there is so much of interest to be seen that unappreciative indeed must be the mind which is capable of dullness. Think of the variations in scenery, from the peaceful green fields of France to the arid wastes of the desolate Nubian Desert; from the modern Continental towns to the ancient cities of Cairo, Luxor, Assuan and Khartoum; from the mountains of Corsica and South Africa to the vast plains of the Sudan; from the watery expanse of the Mediterranean to the narrow silver ribbon of the life-giving Nile. Such outstanding landmarks of beauty and interest as Mount Etna, the great Pyramids of Giza, the barrage at Assiut, the wonderful dam at Assuan, the Union Jack layout of Khartoum, Lake Victoria, Kilimanjaro, the glorious rolling country of Northern and Southern Rhodesia and the wonderful vista of Table Mountain and Cape Town beneath.

Travel by air is so simple. You

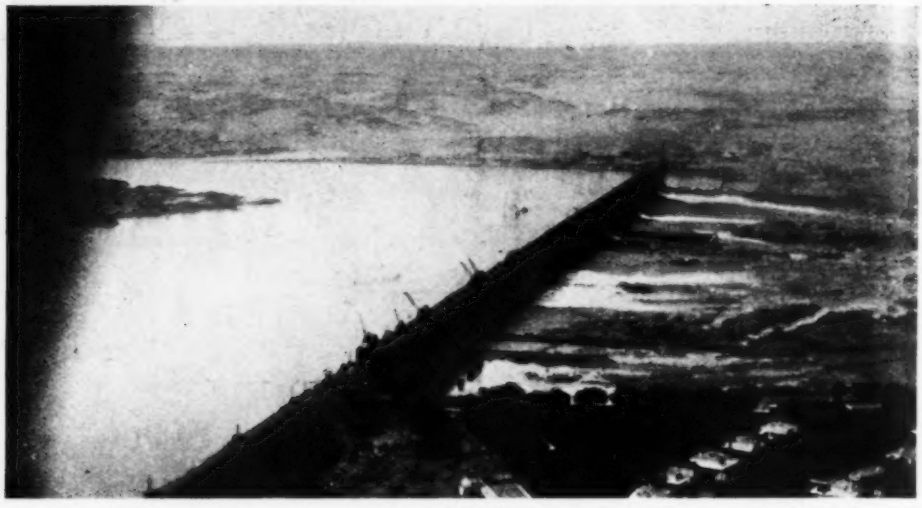
KILIMANJARO : An excellent landmark for airmen. (*Photo, W. J. Makin.*)

buy your ticket, and that includes everything except casual drinks for which books of chits are sold at £2 10s. a series. These chits can be exchanged for coin of the realm at any landing place. There is no worry of never-ending tips, no Custom bothers. Gone are the horrors of rail changes, the nuisance of embarking and disembarking, the nightmare of lost luggage, and the ugly noise and bustle of stations and docks. Gone are those grilling railway journeys across desert country where sand blows in through the window cracks and cannot be kept out. Beside the inanimate beauties of Nature's scenery and the concrete wonders of man's architectural art, there is always the animate wonder of jungle life, which can be seen from the air. These views from above of big game are one of the chief delights of aerial travel in Africa. In Southern Sudan are to be seen herds of elephants. Over Kenya and Tanganyika the traveller sees thousands of giraffe, wildebeeste, zebra and buck. Nature may have camouflaged these animals on the ground level with speckled or dun-coloured coats, but from the air they are easily distinguishable. A famous South African pilot tells how, while flying in Nairobi, he once observed twelve lions slinking after an immense herd of cattle, probably only awaiting night-time to attack and kill.

Sir Harry Brittain foresees the day, not far distant now, when Cape Town will be within five days of London, Kenya three and Egypt one. Cape Town, with its marvellous surf bathing and glorious climate will become a health resort for English people. Kenya, a veritable paradise for game hunters and fishermen will become a playground, not only for inhabitants of Africa, but for dwellers in Great Britain. The growth of feeder lines east and west will enable settlers and Government officials in out-of-the-way districts to obtain pleasanter and more frequent holidays, and to keep in more constant touch with their fellow-men.

South Africa, Sir Harry Brittain was frequently informed, is to-day somewhat undeveloped as regards aerial

MALTA : A possible future airport. (*Photo, W. J. Makin.*)



Assuan Dam looking west ; note the heightening operations. (*Photo, W. J. Makin.*)

transport and aviation in general. The desire and realisation of utility are present, but initiative is slow. The Wilson Air Lines have done much to open up certain parts of the Continent. Mr. Gordon Store is running a flying school in Cape Town, but on the whole aviation has not gone ahead as it has done in many parts of the world where conditions are nothing like so favourable. Great praise is due to the Royal Air Force stationed in Khartoum, who look after one million square miles of territory and give valuable assistance to Imperial Airways.

Sir Harry Brittain lays emphasis on the great beauty of the flight from Athens to Brindisi, which is flown in very comfortable flying-boats, and on the loveliness of the isle of Malta in the midst of the deep blue waters of the Mediterranean. He would be very pleased if this little island could be brought into the Empire route. While in Cape Town the great compliment was paid Sir Harry Brittain of being invited to address members of both Houses of Parliament at a particularly interesting period of the Union's history, and as founder of the Empire Press Union he was welcomed by leading newspaper men at gatherings at Cape Town and Johannesburg.

In conclusion, Sir Harry Brittain expressed the conviction that Imperial Airways, which had done much in the past, would do even more in the future to open up those parts of the British Empire which are situated in the African Continent. Englishmen who were serving their country abroad either in commerce or in Government Services, would be brought closer to their homeland and enabled with greater frequency to visit their friends and relations, thus binding closer the home ties on which our great Empire so largely relies to-day.

Sir Harry Brittain, by the way, is shortly writing an historical aeronautical book.

THE DE HAVILLAND "LEOPARD MOTH"

A Successor to the "Puss Moth"

So successful have been the last two types produced by the de Havilland Aircraft Co., Ltd., the "Fox Moth" and the "Dragon," that it is not surprising to learn that similar structural methods will be used in the new production which the company is about to bring out. To be known as the "Leopard Moth," the new machine will resemble in a general way the "Puss Moth," which it has been designed to replace. It is intended as a fast and comfortable machine for the private owner, and will have obvious advantages as an air taxi or small mail carrier. Like the "Puss Moth," the "Leopard Moth" will have accommodation for pilot and two passengers, with a separate luggage compartment. Dual controls will be fitted, and the machine will carry as standard equipment wheel brakes and air brakes. The engine will be the de Havilland "Gipsy Major" of 130 h.h.p., and it is expected that the new machine will have an even better performance than the "Puss Moth." The passengers will sit side by side behind the pilot.

The "Leopard Moth" will be mainly of wood construction, with wooden wings and plywood-covered fuselage. This combination has been found both light and strong in the "Fox Moth" and "Dragon," and the special D.H. system of weather protection used has been found very serviceable, while the spring washer method of bolting wooden parts together has been proved capable of taking care of any wood shrinkage which may take place. That being so, and wooden construction being both lighter and cheaper than metal construction, there is a great deal to be said for its use.

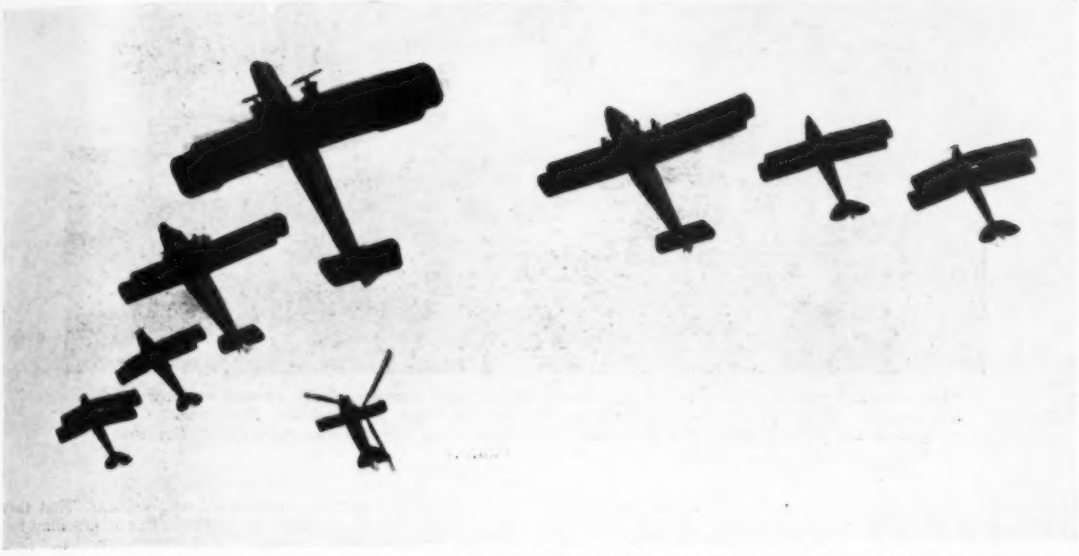
A batch of six "Leopard Moths" has been laid down. These will be used for experimental and demonstration purposes only, and quantity production will not be begun until the company is satisfied that every possible improvement has been incorporated. Although orders cannot be accepted at present, the de Havilland Company will be glad to answer the inquiries of private owners, operators of air-taxi services and others who may be interested.

The Long-Distance Flight

The Royal Aero Club has been notified by the International Aeronautical Federation that the long-distance flight made by Sqd. Ldr. O. R. Gayford and Flt. Lt. G. E. Nicholetts, on the Fairey Long Range monoplane fitted with Napier "Lion" engine, has been officially accepted as a world's record. The flight started at Cranwell on February 6 and finished at Walvis Bay, South Africa, on February 8, a total distance of 5,309 miles.

S.B.A.C. Officers

The following have been elected as officers of the Society of British Aircraft Constructors, Ltd., for the year 1933-34:—Chairman, Mr. Herbert J. Thomas (The Bristol Aeroplane Co., Ltd.); Deputy Chairman (Aircraft), Mr. C. C. Walker (The de Havilland Aircraft Co., Ltd.); Deputy Chairman (Engines), Mr. A. F. Sidgreaves, O.B.E. (Rolls-Royce, Ltd.); Hon. Treasurer, Mr. J. Lord (Saunders-Roe, Ltd.).



Part of Sir Alan Cobham's fleet in formation. The Handley Page "Clive" is leading, with an Airspeed "Ferry," D.H. "Fox Moth" and "Tiger Moth" on each side of it, while below an "Autogiro" whirls its way. (FLIGHT *Photo.*)

"AIR-MINDING" THE PUBLIC

This Summer Sir Alan Cobham is sending two units round the country to interest people in aircraft and to introduce them to the pleasures of flying

LAST year Sir Alan Cobham's National Aviation Day visited some 200 towns and cities. This year he has organised two separate tours which will, between them, give flying displays and joy-riding at no less than 320 different places.

The programme commenced with displays at Dagenham and Southend during Easter, and the itinerary includes visits to both Scotland and the Irish Free State.

As may well be imagined, Sir Alan has benefited by his past experiences, with the result that it is most difficult to pick any holes at all in his organisation. The fleet of aircraft which he has got together is extremely adaptable, including as it does such varied machines as the Handley Page "Clive," the "W.8" of the same maker, the Airspeed "Ferry," the D.H. "Fox Moth," the D.H. "Tiger Moth," the Klemm, and that hardy old joyriding war-horse the Avro "504." This means that it will always be possible to send a sufficiency of aircraft to any place whatever the size of the landing ground booked for their use, so that the public will be able to fly in cabin or open machines, just as they wish.

The majority of Sir Alan's fleet assembled at Heston on April 12 for an inaugural luncheon and a preliminary demonstration. Amongst those who entertained the guests were Mr. Lowe-Wylde, who did hair-raising things on his "Drone"; Capt. A. N. Kingwill, who raised our hair to an almost equal extent on an Avro ("Mongoose"); Mr. W. McKay, whose aerobatics on another Avro ("Clerget") were perhaps not quite so hair-raising; and Flt. Lt. C. K. Turner-Hughes, who aerobatted a "Tiger Moth" in a very polished manner.

An impressive item of this day's programme was a fly-past in formation of both the "Circuses." In one the "Clive" led with a "Ferry," "Fox," and "Tiger Moth" on each side of it, while an "Autogiro" whirled its way just beneath. The other was led by the Klemm, which had three Avros on either side. This division of the aircraft is not necessarily that which will pertain during the Tour, as the allocation will be governed by the size of the landing grounds available.

At the luncheon Lt. Col. H. W. S. Outram, Director of Aeronautical Inspection, represented Col. F. E. Shelmerdine, Director of Civil Aviation, who was unavoidably prevented from being present. Col. Outram admitted that a year ago he held a great aversion for shows of this kind and looked upon them with horror, but the past year's work of Sir Alan had convinced him that aircraft could be maintained adequately under such conditions, so that there was no doubt whatsoever about their airworthiness. He now knew that Sir Alan's organisation was equal to the task and competent to carry such grave responsibility.

Sir Alan, in reply, first introduced Mr. Lacon Threlford, a Sheriff of the City of London, whom he was proud to have there that day. He paid a grateful tribute to Lady Cobham for the work she had done during the Tour in South Africa, and opined that she, even better than he, might write a book on "Mayors I have met."

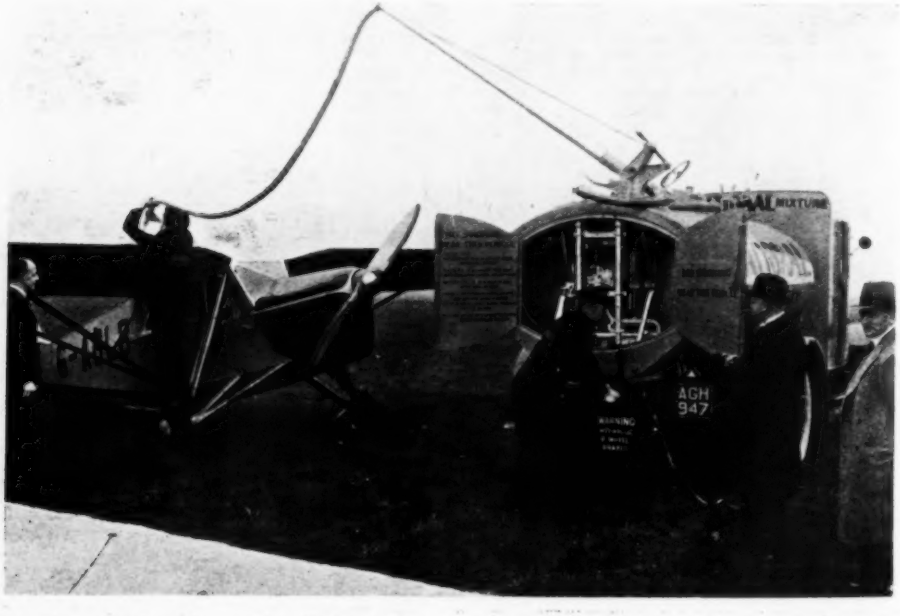
Sir Alan announced that this year's Tour was historic

Sir Alan Cobham broadcasting interesting details during one of his displays. On his right is a member of the staff in the official uniform. (FLIGHT *Photo.*)

Circumstances will probably necessitate many of the staff sleeping under canvas at some of the aerodromes. Here we see the large number of canvas tents prepared for their use. On the right of the photograph is the elaborate refreshment van which is accompanying the tour. (FLIGHT *Photo.*)

inasmuch as Mr. Fred Holmes, with whom he started joyriding in 1919, had now joined up with him again; as also had Mr. Rimmer. His Tour last year, he said had been instrumental in the establishment of 59 new landing grounds; this year he hoped to do better. He himself was going to fly constantly between both waits.

Many people appeared to have been induced to collaborate with Sir Alan to varying extents. The Pullman Road Refreshment Car Co., of Brighton, have a large double-deck sort of glorified coffee-stall affair with various subsidiary annexes, under which cups of coffee and probably "hot dogs" may be obtained in comfort when it rains; Leyland Motors are represented with several lorries, one of which for each "Circus" is fitted as a broadcasting van by Phillips; Dunlops have their name painted in no mean lettering on a large number of green Willesden canvas tents, sufficient in fact to house the complete entourage if this should be necessary; Armstrong-Siddeley cars are being used for ground transport; and it is interesting to know that these cars are the same ones which went with last winter's tour to South Africa. That they are still in perfect running condition after a gruelling test of this nature speaks volumes for their construction. Each "Circus" is relying on National Benzole Mixture for their fuel, and this is being supplied in each case in a new and interesting type of tank wagon. These tanks are products of the Transport Department of the National Benzole Co., and are mounted on Leyland chassis. They embody many new features and have been designed by the company specifically for aerodrome work. The 800-gall. tank is of welded aluminium and is mounted on flexible trunnions, so that much of the road vibration is damped out. At the rear end of the tank a hand pump, which can deliver at 15 gall. per min., is fitted and the flexible delivery hose is led out through the top by means of a raised swivelling arm. The chassis is a six-wheeled one, and provision has been made for detachable caterpillar tracks, not only for use in cases of emergency, but also as a means of preventing damage to the surface of soft aerodromes.



A view showing the special National Benzole mixture lorry refuelling the company's own "Puss Moth." On the right of the picture is Mr. R. J. Smith, the sales manager, and next to him (in bowler hat) is Mr. A. Hittinger, general manager. On the extreme left is Mr. J. Scholes, the company's pilot. (FLIGHT *Photo.*)

Air Transport

THE G.W.R. AIR SERVICE

AN occasion of some considerable importance was the inauguration of the Cardiff-Teignmouth (for Torquay)-Plymouth air service on Tuesday, April 11. The Great Western Railway, under the powers granted them by Act of Parliament in 1929, have come to an agreement with Imperial Airways, Ltd., whereby that company will run a Westland "Wessex" (three 7-cylinder "Genet Majors") twice daily, in each direction on this route. The time-table, daily including Sundays, is as follows:—

		A.M.	P.M.
Depart	Cardiff General Station	9.00	1.30
,,	Cardiff Airport	9.15	1.45
,,	Haldon Aerodrome	10.10	2.40
Arrive	Roborough Aerodrome	10.35	3.05
,,	Plymouth North Road Station ...	10.55	3.25
Depart	Plymouth North Road Station ...	11.00	3.30
,,	Roborough Aerodrome	11.25	3.55
,,	Haldon Aerodrome	12.00	4.30
Arrive	Cardiff Airport	12.50	5.20
,,	Cardiff General Station	1.00 p.m.	5.30

The fares will be: Cardiff-Teignmouth, £3 single, £5 return, and Cardiff-Plymouth, £3 10s. single and £6 return, as compared with 28s. 6d. single and 57s. 0d. return, and 36s. 5d. single and 72s 10d. return, respectively, for first-class railway fares. In the matter of time the air service naturally shows to very great advantage, there being a saving of 2 hr. 30 min. to Teignmouth and of 3 hr. 10 min. to Plymouth. The "Wessex" bearing the appropriate registration lettering G-AAGW, which has been used by Imperial Airways for some considerable time with conspicuous success, has been repainted in the G.W.R. colours of cream and chocolate, while the cabin has been upholstered throughout the same as one of the company's first-class railway carriages.

Operations on Tuesday started with an official lunch at Cardiff, presided over by Sir Henry Jackson, Director of the G.W.R., after which AAGW, accompanied by another "Wessex" and Mr. Maurice Jackaman's "Monospar," left for Haldon. On arrival there they were received by Mr. Geoffrey Luttrell, G.W.R. Director, and the Mayor of Torquay (Mr. W. Denis Thomas).

At Roborough the party were welcomed by the Earl of Mount Edgcumbe, G.W.R. Director, the Mayor of Plymouth (Mr. R. R. Oke), the Town Clerk and Capt. F. J. Deane, due to whose energy the airport has been established.

The Mayor in a short speech announced that the Airport Committee were willing to help the G.W.R. in every way to make their venture a success, and were therefore providing free landing facilities at Roborough for the five-months season during which the service is to be tried out.

The Earl of Mount Edgcumbe visualised the time when the passengers and mails landed from ocean liners at Plymouth would be sent all over the country by air.

The opening of this service stamps the Great Western as the first railway company to run their own air lines, although at least two other companies are known to have financial interest in air-operating companies. That they have chosen the method of getting Imperial Airways to run the service for them may give rise to criticism, but it must not be forgotten that they have to buy their experience somehow, and from the users' point of view it is difficult to imagine a safer way of doing this than by collaborating with Imperial Airways, whose record for safety is second to none in the world. Furthermore, if air lines are to be used by the general public as an every-day means of travel, safety must be the first consideration, followed closely by comfort, lack of noise and speed.

THE GREAT WESTERN AIRWAY: The inauguration on April 11 of the air service by the Great Western Railway between Roborough, Plymouth, and Cardiff. The Mayor of Plymouth (wearing chain) welcoming the G.W.R. officials on their arrival at Plymouth airport. On the Mayor's right is the Earl of Mount Edgcumbe, a director of the Great Western Railway.

Mails for Canada

THE Postmaster-General announces that, with the opening to navigation of the St. Lawrence River, air mail correspondence for Canada sent by certain of the Canadian Pacific Railway Company's steamers will again receive onward air conveyance from Rimouski on the St. Lawrence to Montreal and beyond, thereby gaining about one day to Montreal, Ottawa, Toronto and Winnipeg, and up to two days to British Columbia. The first despatch for this service was by the *Duchess of Atholl*, sailing from Glasgow on April 14. The air postage rates are:—Letters, 2½d. for the first ½ oz. and 1½d. for each additional ½ oz.; postcards, 2d.

"Atlantique" as Air-Base

M. GAYRAL, a French engineer, has put forward the suggestion that the French luxury liner *Atlantique* should be turned into a floating base for seaplanes and flying-boats, midway between Europe and America. The hull of the vessel has not been greatly damaged, and if the superstructure were removed a deck about 900 ft. long and 98 ft. wide could be laid down on to which aircraft could be hoisted and catapulted off again.

Lessons of the Do.X

By DR. C. DORNIER

(*Concluded from page* 357)

The Hull

THE first trial flights proved that the underwater shape of the hull was correct. The boat had no tendency either to raise her bows unduly or to bury her nose. The take-off occurs practically without any yawing and it is unnecessary to use rudder to keep her straight.

Due to the change over from air-cooled engines to the water-cooled Curtiss "Conquerors" a small increase in the width of the stub plane was required in order to ensure the necessary stability, in view of the higher centre of gravity. This is the only external alteration to the hull of the boat that appeared necessary and has actually been made.

The hull was stressed in accordance with the existing German regulations of the German Aeronautical Experimental Establishment, the Deutsche Versuchsanstalt für Luftfahrt, and the boat is calculated for an all up weight of 56 tons for freight traffic purposes.

Certain strengthening was necessary as the result of damage which the boat sustained at Las Palmas. During an attempted take off under heavy load its starboard stub wing struck a high wave at a speed of 130 km. per hour. This sudden braking action on one side introduced a twisting movement causing asymmetrical inertias which tended to turn the wing round its vertical axis in relation to the hull.

The same degree of damage occurred to the top portion of all three main frames and was quite uniform. There had, up to that time, been no reason to anticipate such forces, and that experience supplied us with new knowledge of which we have taken due note. The hull and the stub plane remained absolutely watertight after the accident.

A certain amount of buckling and flattening of the starboard stub wing took place, such as occurs very often in overloaded aircraft when taking off or landing in a swell.

Careful examination of the damage to the separate members of the supports enabled us, with the help of buckling and tensile tests, to come to some very interesting conclusions as to the magnitude of forces that had occurred.

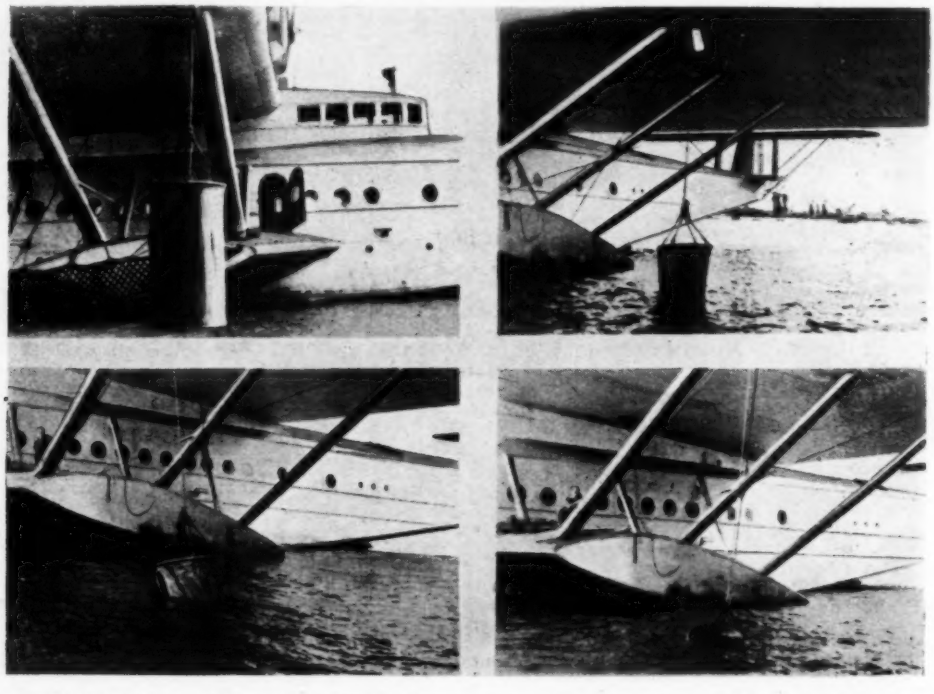
The additional strengthening which was carried out increased the total weight by about 80 kg. Apart from this, only very slight alterations were required to the whole of the hull.

As the result of our experience to date, we are convinced that certain parts of the hull as originally designed are considerably over-dimensioned. For this reason we believe it possible in future, purely by a redistribution of material without increasing the weight, substantially to strengthen the whole of the hull.

The take-off and landing speeds of the ships so far constructed by us, which possess no slots or other means of decreasing the take-off and landing speed, are high on account of the high wing loading. These speeds are for a total weight of 55 tons in the region of 130 km. In spite of this, apart from the damage at Las Palmas, no defects in the hull developed during the whole tests of the Do.X 1a, and we consider ourselves justified in thinking that with the existing wing loading, but using slots or flaps, a considerable increase in the seaworthiness can certainly be obtained.

If in future we store the petrol in a double bottom, as I have already suggested, instead of storing it in separate containers, the seaworthiness of the boat would be further improved. The skin of the hull itself would then absorb a large proportion of those stresses which arise when taking off and landing, and the framework of the boat would no longer be required to cope with them. As the weight of the fuel can account for as much as 30 per cent. of the total weight, it is quite clear that a substantial improvement in seaworthiness can be achieved on these lines.

It is interesting to note that the boat can take off in a side wind parallel to the swell. This starting technique



THE DO.X AS A YOKE: The Dornier Company were the first to use trimming buckets for steadying the machine when on moorings, as shown in these photographs.

came to be used more and more during the trial flights, and without doubt frequently made starts across the swell possible which might otherwise have been attended with disastrous results. The demands as regards taking off and manœuvrability made on the boat can best be shown by the places which were visited during the flights in Germany.

Of particular note was the visit to Hamburg, where take-offs and landings were made in the Parkhafen and on the Alster. The landings on, and flights from, the Müggelsee near Berlin were also a novelty.

The division of the boat into three different decks proved its worth, and will always be adhered to in future. Improvements, however, appear desirable in the sound proofing of the passengers' cabin. The use, particularly in the tropics, of Cellon windows proved absolutely impracticable. We were compelled to substitute glass.

The arrangement of having communicating pilot's cockpit, chart room, and engine control room, proved most satisfactory, and will be adopted in future construction. It became evident, on the other hand, that the wireless telegraphy cabin, which in the Do.X 1a is placed behind the engine control room, should be situated next to the chart room to assure better communication.

The stub wings, the underwater junction of which with the hull are well faired-in in contrast to our former practice, proved their worth thoroughly under the most varied conditions. They are quite invaluable for getting on board and leaving the ship, and for all manner of other purposes afloat. They make coming alongside in other craft a simple and safe operation even in rough weather. Furthermore, it was possible to take passengers and goods on board whilst taxying up to a speed of 30 km. per hour.

I am convinced that it was due to the stub wing construction that the accident at Las Palmas ended as well as it did. Had independent auxiliary floats been fitted the turning force would have been applied further away from the centre of gravity ; that is, the speed of the turn would have been greater, so that, apart from the fact that the auxiliary floats would have been crushed, a yet greater strain would have been placed on the wing supports.

The stability of the boat was fully tested—often under most difficult circumstances—and when correctly handled was amply sufficient. The behaviour of the boat in tow and at a buoy is excellent. It frequently happened that the flying ship was moored to a buoy for many hours in a wind speed of 80-100 km.

We were the first to use trimming buckets as a precautionary measure whilst the Do.X 1a was moored to a buoy during changing squally winds, and obtained good results with them. These consist of cylinder-shaped canvas containers fastened by a rope to the upper end of the wing strut; they are let down so far that they fill and are suspended so that their tops are level with the surface of the water. As soon as a strong gust of wind lifts the wing, the trimming bucket on the opposite end lifts, and for every inch it rises the weight increases. The same effect takes place whichever side rises. Their damping effect is excellent; and they gave very good service at Lisbon, for example, during repairs to the wing, where they were continually in use. As a result of this experience with the Do.X 1a we have recently fitted our smaller boats with this useful adjunct.

The wing is, as is well known, supported by struts extending from the stub planes. This method of wing fixture is often criticised unfavourably in expert circles. It was feared that damage to the stub plane in swells could endanger the entire wing structure. I can testify that, although we have adopted this type of wing bracing over a period of approximately 14 years in a great number of our boats, not one single case has occurred of stub plane damage leading to an accident.

The system of supporting the wing from the stub plane has also proved itself satisfactory in every way in the case of the Do.X.

Wing Unit

The shape of the wing, its section, and its internal structure, have remained the same in all the three boats so far constructed.

For Group P3, passenger traffic, the load at 53 tons still falls within the German Experimental Establishment, the Deutsche Versuchsanstalt für Luftfahrt's Regulations now in force. For goods traffic Group G2—the boat at 56 tons fufils present requirements.

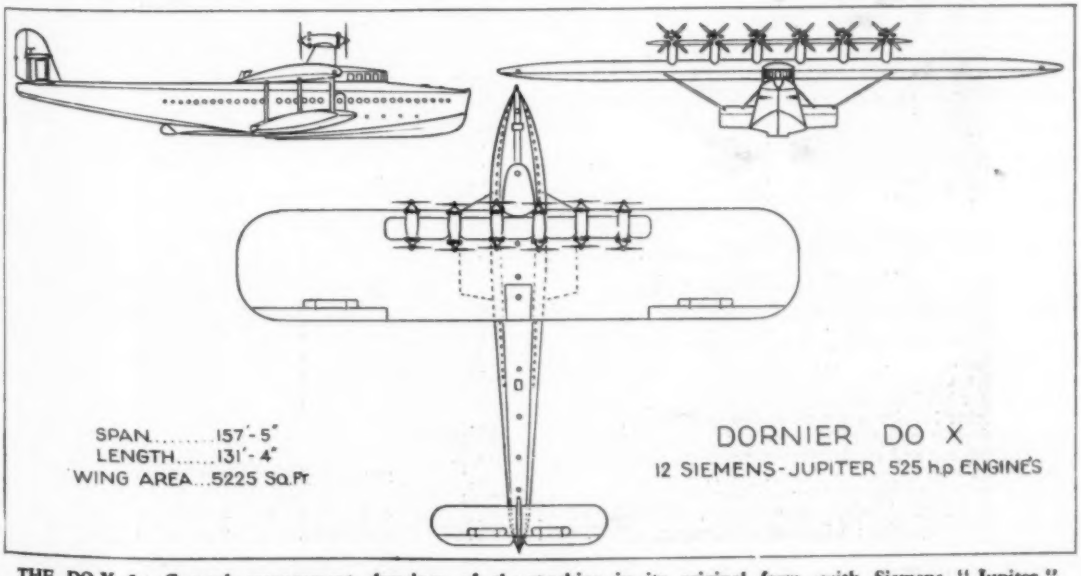
As Do.X 1a did not weigh more than 56 tons during its flight from New York to Berlin, it is perhaps the first time that the Atlantic has been crossed by an aircraft that complied with the official factors of safety regulations.

In passing, I should like to mention that this was the first Atlantic crossing of an absolutely closed-in aircraft carrying complete accommodation for 75 persons—a total weight of some 1,800 kg.

The wing itself is of three-spar construction and its surface is made up of rigid sections measuring 2.8 by 2.8 m. covered with thin metal sheet or fabric. This new system of wing covering proved its manifold advantages during the fire, which I have already mentioned, at Lisbon.

It was thanks solely to the interchangeability of the wing-covering sections that we were able to carry out repairs without any extra help in so short a space of time—in the open and while the boat was in the water.

No signs of corrosion made their appearance in the wing.



THE DO.X 1 : General arrangement drawings of the machine in its original form, with Siemens "Jupiter" engines.

The fabric covering of the wing proved quite satisfactory, in spite of considerable condensation having occurred internally at first. This undesirable feature was cured by sufficient ventilation.

The tail unit was calculated with particularly generous factors of safety, and even to-day falls within the most recent strength requirements. No alterations of any sort or strengthening of the tail unit have been found necessary.

It was decided to remain in New York for the winter, as the season was too advanced for the return flight; a primitive slipway was made and the boat, chocked up, made its winter quarters in the Glen Curtiss Air Port. During this time she was struck by lightning, without being damaged, in the course of a violent thunderstorm. The involuntary delay was used for overhauling the engines completely and for carrying out some modifications suggested by the Curtiss Wright Corporation—the result of which increased the output of each individual engine by 50 h.p.

The excellent condition of the flying ship, after its return to Germany, can best be judged by the fact that, immediately after its inspection by the public, near Berlin, a flight round Germany was begun.

During the flight Travemünde was visited, and the opportunity was taken to put the boat into the floating dock which existed there.

On the return to Altenrhein the engines were taken out and inspected, and only showed signs of insignificant wear.

The hull was again inspected minutely and put in order for the coming flights. These inspections took about 10,000 man-hours.

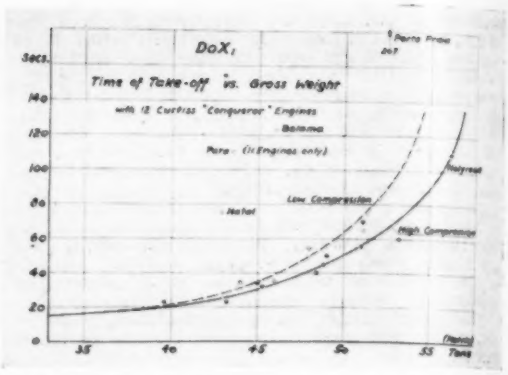
The major part of the overhaul work consisted of renewing the wing fabric which we considered advisable.

Flying Performance

The greatest weight with which a take-off has so far been made is approximately 56 tons, and this weight was reached during the take-off in Holy Rood for the trip to Horta. In spite of very squally weather it was possible slightly to throttle down the engines immediately after the take-off.

The diagram shows the take-off curves for the Do.X 1a when she was first re-equipped with Curtiss "Conqueror" engines, and also after the improvements to the engines, suggested by the Curtiss Wright Company, had been made.

This diagram includes a number of "take-offs" under unusual conditions. The influence of a tropical climate on the speed of take-off was extraordinarily interesting. For instance, it takes the Do.X 1a 40 seconds to take off at a weight of 46 tons in European waters, whereas 123 seconds were required in the tropical summer of Bolama. An average temperature of 80.6 deg. Fah. was registered during the three weeks' period of take-off tests at Bolama and the humidity of the air was nearly 100 per cent. The flying ship at a weight of 54 tons got on the step reasonably quickly, but was unable to leave the water. A start at even 50 tons weight at Bolama proved absolutely impossible. From the diagram it will be observed that the rates of take-off improved substantially after modification of the engines.



"UNSTICK" CURVES: Times to take-off at various gross weights.

The average cruising speed of the Do.X 1a throughout the whole test period was 168 km. per hr. and the average engine revolutions were 2,170 per min. The all-up weight of the aircraft fluctuated widely during the test. The average weight for the cruising speed I have just mentioned may be taken as about 47 tons.

Inaccurate statements regarding the boat's climb are, I believe, current. For instance, "Jane's All the World's Aircraft" for the year 1932 gives the service ceiling at 500 metres. As is well known, the two boats ordered by Italy had, during delivery, to be flown over the Central Alps; moreover, Lake Constance is 400 metres above sea level; it is, therefore, perhaps not inopportune to make known the fact that the real ceiling is somewhat higher.

The average fuel consumption of the Do.X 1a, as

TABLE II

Section	Do.X 1 with Siemens "Jupiter."	Do.X 1a with Curtiss "Conqueror."	Do.X 2 with Fiat A22 R
	kg.	kg.	kg.
Airframe weight comprising: wings, struts, tail unit, controls, hull including "B" deck flooring, engine mountings, engine nacelles, exterior paintwork	19,029	19,094	19,063
Engine installation according to Table I	7,007	8,083	10,103
Lubricating oil installation	340	485	474
Fuel installation	1,200	1,200	1,200
Engine instruments comprising: revolution counters and petrol, lubricating oil and radiator gauges	229	254	264
Flying instruments comprising: speed indicator, altimeter, inclinometer	36	36	36
Navigation instruments: compass and navigation table	36	36	36
Lighting comprising: source of electrical energy, lamps, wiring and generator	250	250	250
Miscellaneous equipment comprising: accessories and instrument boards	90	90	90
Accessories equipment: fire extinguishing installation, D.K.W. motor for W/T and lighting system, tool kits, special engine tool kits, covers for airscrews and engine nacelles	700	700	700
Communication equipment comprising: soundproof W/T cabin, complete sending and receiving sets, emergency sending set, D/F set and signalling apparatus	370	370	370
Marine equipment comprising: anchor and fittings, bilge fittings, cleats, towing fittings, safety appliances, water rudder	400	400	400
Equipment comprising: windows and flooring	200	200	200
Total weight	29,887	31,198	33,185
Kgs. per cruising horse-power	8·03	6·26	5·32

calculated over the whole of the tests, can be taken as 7.45 kg. per km. I am prepared to admit that we had reckoned on a considerably lower figure, and in the two Italian boats we were able to reduce the consumption to 6.95 kg. per km. These fuel consumption figures apply when all engines are in use.

"The maximum distance that can be flown without paying load is 3,200 km."

The cruising speed, the fuel consumption, and the operational radius have not proved to be substantially less than our anticipations, as is shown by the comparison given in Table III.

TABLE III

Comparison of Calculated Performance given in 1928 *with Performance Obtained in Practice*

—	Lecture to R.Ae.S., 1928	Flight tests, 1930-32	Difference
1. Maximum horse-power	6,000 h.p.	7,400 h.p.	+ 1,400 h.p.
2. Maximum all up weight	54,000 kg.	56,000 kg.	+ 2,000 kg.
3. Maximum total load	25,800 kg.	24,800 kg.	— 1,000 kg.
4. Fuel consumption	6·10 kg./km.	7·45 kg./km.	+ 1·35 kg./km.
5. Cruising speed	185 km./h.	168 km./h.	— 17 km./h.
6. Maximum endurance	4,042 km.	3,200 km.	— 842 km.

Useful Load Ratios

In Table II the structure weights of the three different types are given, and these were obtained by weighing.

Referring to the difference in the weight of these prototypes compared with the figures I gave in the course of my lecture in 1928, I would draw your attention to a comparison which I gave in this connection in my lecture to the German Scientific Aeronautical Association, the Wissenschaftliche Gesellschaft für Luftfahrt, in 1929, and which was published in the 1929 edition of the Association's Year Book.

With a structure weight of 31.2 tons for the Do.X 1a the greatest useful load is 24.8 tons. This corresponds to a useful load to total weight ratio of 44 per cent. The normal total weight for the Do.X 1a should be taken as 48.7 tons, according to the experience we have so far gained.

The "take-off" at this weight then occurs in about 40 seconds under normal conditions and the proportion of useful load to total weight is 35.7 per cent.

I have endeavoured to establish the ratio of useful load to total weight in different types of modern multi-engined flying boats and landplanes. Unfortunately, it is seldom possible to obtain the structure weight with any degree of certainty from technical publications—only in isolated cases—but I have frequently found this ratio in modern multi-engined aircraft to be between 26 and 38 per cent., so that the flying ship, with its 35.7 per cent., does not compare unfavourably.

The useful load per cruising horse-power works out at 3.38 kilogrammes for the Do.X. I have endeavoured to ascertain this ratio for other multi-engined aircraft and have arrived at a similar figure.

The petrol consumption of the Do.X 1a per ton kilometre of useful load is 0.431 kg., whereas that for certain other aircraft I know works out between 0.4 and 0.5 kg.

I would now like to summarise our experience with the flying ship up to the present:—

"Using the customary methods of calculation, and adhering strictly to the present German regulations governing the factors of safety in the air and on the water, we have been able to build a flying boat with an all-up weight of 56 tons. The flying characteristics of this flying ship are absolutely normal; no unpleasant characteristics of any kind such as are occasionally found in smaller aircraft were observed during the flight—on the contrary, flying ships behave much better in bad weather than do some of the smaller boats that we know. The boat can be flown by one pilot for hours on end without undue fatigue; taking off and landing is quite normal and can be carried out by any pilot of average ability. The take-off and landing runs are remarkably short, and manœuvrability, as well as the behaviour at a buoy and while in tow, are all excellent. The highest useful load is 24.8 tons. The normal useful load is 35.7 per cent., and the maximum 44 per cent. of the total weight—a ratio which is well within the performance figures for smaller modern multi-engined aircraft.

"The fuel consumption under ordinary conditions of continual service is 7.45 kg. per km.

"The cruising speed is 168 km. per hour."

Column 1 gives the figures which I quoted in my lecture to the Royal Aeronautical Society in the spring of 1928, the second column gives the figures obtained as the result of tests with Do.X 1a.

The size of the ship made it impossible to introduce improvements during construction or test, which would have presented no difficulty in a smaller aircraft.

With a smaller single-engined boat, for instance, it would have been quite a simple thing to try out two or three different airscrews. With the Do.X this would have meant the production of 24-36 airscrews. This applied equally in every other respect to the engine installations and their accessories, as, for example, the water and oil radiators.

The effect of making alterations to any part of a ship of that size may be gauged by the fact that approximately 300,000 working hours were required for the preparation of the working drawings alone.

In comparing the performance of the flying ship Do.X with that of modern aircraft, it must be remembered that the ship, with all its construction details, was laid down as long as five years ago, and it was not possible to make any extensive alterations. In the meantime science has not stood still, and it is obvious that the designs on which we are now working will include quite a number of improved features which it is anticipated will result in better performance and reliability. Considered from the present-day standpoint, the comparatively primitive aerodynamical design of flying ships built at that time render them particularly susceptible to those improvements in performance which have been applied in the meantime to a greater or lesser degree to most modern aircraft.

The size of our flying ship gives the crew and passengers a sense of security which is absolutely unknown in smaller aircraft during flights over wide stretches of open sea. This feeling of security is an absolutely essential feature for any future regular traffic over long sea routes.

The need for air transport on long sea routes certainly exists, and the establishment of air lines to span the ocean is equally certainly one of the most fascinating and satisfying problems with which air transport is faced.

For this problem, however, only the large seaplane, the flying ship, can be considered a satisfactory solution.

It is in this undeniable fact that I find sufficient satisfaction for the time and money that we have devoted to the development of the first flying ship.

THE DISCUSSION

Mr. Fairey said he did not wish to take part in the discussion, but he would like to express his appreciation of the frankness with which, in the paper, Dr. Dornier had admitted his failures and of the modesty of his claims of successes. He would remind those taking part in the discussion that Dr. Dornier had, apparently, like all good scientists, an excellent memory, to which reference in the paper concerning Dr. Dornier's previous lecture to them bore witness. Some of those present had expressed certain opinions during the discussion of the 1928 paper, and he thought he ought to warn them that Dr. Dornier probably remembered their remarks of five years ago. He then called upon Mr. A. Gouge (General Manager of Short Brothers) to open the discussion.

Mr. Gouge said that he was not one of those who took

part in the discussion five years ago, and therefore he felt reasonably safe so far. Concerning the damage to the sponson, to which reference had been made, he was a little puzzled as to how Dr. Dornier came to the conclusion that the damage was in a fore and aft direction. His experience had always been that in a case of this sort the damage was always in an upward or sideways direction. He thought a useful load of 36 per cent. very good for a machine of the size of the Do.X. In the case of a boat with which he had had something to do (Mr. Gouge was here obviously referring to the Short six-engined R.6/28 boat), the gross weight was something like 70,000 lb. and the useful load was about the same percentage as in the Do.X, *i.e.*, 36 per cent., or perhaps a little more, for the same take-off time. Concerning the time taken in getting out the drawings, the Short boat had taken something like 100,000 hours.

Air Commodore Cave-Browne-Cave (Director of Technical Development, Air Ministry) said he had one or two questions he would like to ask. The lecturer referred to carrying fuel in the hull, as far removed as possible from the engines and from electrical equipment. He would have thought that there was quite a good deal of electrical equipment in the hull, fairly close to the petrol, and he wondered how they did their cooking on the Do.X. In British flying boats it was customary to carry the fuel in the wings, leaving the hull entirely free, when cooking could be carried out without risk of fire. He did not remember previously having seen any reference to the use of trimming buckets, and thought these were a good scheme. Finally, he would like to know what sort of anchors were used on the flight, if any. Or did they always use moorings?

Maj. R. H. Mayo said he would have liked to hear more about the take-off conditions when the damage to the sponson occurred. With such high take-off speeds it was very important to know what were the limiting conditions of sea and wind in which the boat could safely be taken off. Concerning the use of sponsons, he rather preferred the British system of wing floats. With one or two exceptions, which were unusual cases, the wing-tip floats had given good results and had given no trouble, and he thought their use in preference to sponsons would save a good deal of structure weight.

Maj. J. S. Buchanan (Deputy Director of Technical Development, Air Ministry) said that he had to admit that he did take part in the 1928 discussion. The remarks he made then, however, were rather cautious and consequently they were not very much out of date to-day. From the figures given in the first paper and those given in the present one it was found that Dr. Dornier had achieved a very close approximation to his estimated figures, and he thought they would all agree that Dr. Dornier had done much to advance the cause and development of the large flying boat. The structure weight achieved in the Do.X was lower than British experts had expected. This might be at least partly accounted for by the high landing speed, which was a great deal higher than we had been prepared to tolerate in this country, but as seaworthiness did undoubtedly increase with size, the higher speed might be permissible. He had been privileged to be a passenger in the Do.X some years ago, and he could agree with the statement in the paper that one did have an extraordinary feeling of security in this large machine.

Mr. C. G. Grey replied, to the reference in Jane's "All the World's Aircraft," of a ceiling of 500 metres, that this figure had been supplied by the Dornier Company. He thought a possible explanation might be that this figure referred to full load, and as regards the flight of the two Italian Do.X machines over the Alps, he thought it unlikely that for this flight the machines were carrying anything like full load, in which case they should be able to get to the necessary height.

Dr. G. Lachmann (of Handley Page, Ltd.) said he was not a flying-boat expert and did not, therefore, feel quite qualified to discuss the paper, but he would say that he had been very impressed by the way in which Dr. Dornier had shown himself prepared to give away detailed figures. This was most unusual, but very welcome. He thought the repair of the wing in four weeks in the open was an extremely good performance, as all of them would doubtless know of cases where a much smaller wing had taken longer to repair in the workshops.

Mr. W. O. Manning would like the lecturer to give some information concerning the worst kind of sea in which the Do.X had got off with full load. If the lecturer could give them some idea of the height of the waves or some similar dimension it would, he thought, be of interest. Concerning Dr. Dornier's method of carrying petrol in the hull, this was done in the British F boats and P boats, but British opinion came to the conclusion that this was dangerous. For example, it was almost inevitable that at some time or other there would be a slight leak. Petrol would slowly accumulate in the bilge and an explosive mixture might be formed in the confined space between the tanks and the hull bottom, which he regarded as very dangerous. On the other hand, Dr. Dornier's suggestion of carrying petrol in a sort of double bottom in the hull was also, he thought, open to objection. If there was a slight leak one ran the risk of getting water in the petrol. Conversely, petrol might leak out of the hull into the water surrounding the machine.

He was also one of those who had spoken during the discussion of the 1928 lecture, and he thought at that time he mentioned the point of using rectangular wings. The reason then given by Dr. Dornier was that the rectangular wing was cheaper to manufacture, but he thought then, and he still thought, that the tapered wing was more efficient aerodynamically and would be lighter. He had noticed that the ends of the sponsons were cut off square, as if sawn off. He would have thought that an improvement might have been made by rounding the tips of the sponsons. Finally, it was, perhaps, interesting to note that with the petrol consumption given by the lecturer this large boat was losing weight at the rate of about 30 lb. per min.

Mr. E. C. Gordon England said that he had had the privilege of being a passenger in the Do.X, and he would very much like to know whether, since then, any effort had been made to deaden the unbearable noise of the twelve engines. He said that when he went up in the machine it was not possible to find a place anywhere in that large hull where one could really say one was comfortable on account of the noise. He had been particularly impressed by the case with which the machine took off and landed, and quoted as an example one occasion when a number of empty sherry glasses were standing on a table (cries of "Oh!" and "Shame"). During the landing they did not move at all, and on another occasion he was, he said, watching very carefully, but even then it was completely impossible for him to tell when the machine touched the water. He was interested in the curve showing the take-off times and gross weights. He timed the machine once when it took off at Calshot, and the run was 58 sec. At the gross weight of the machine at the time, this take-off time fell exactly on the curve shown.

Col. Fell (of Rolls-Royce, Ltd.) said he had been interested in the lecturer's reference to the advantages of putting the engines in the wing. To do so would presumably necessitate the use of some form of shaft drive. There were two general types, the straight and the bevel gear type. It would be of very great help to aero engine people if the lecturer could give them an idea which of the two types could most profitably be developed. There was no particular fundamental difficulty in producing such a drive, but designers would be grateful for a lead as to which type to choose.

The Trans-Atlantic Air Route

IN reply to a question in the House of Commons on March 29 by Rear-Admiral Sueter regarding the Trans-Atlantic Air Route, Sir Philip Sassoon said that Pan-American Airways were considering the opening of a service from New York to Bermuda. It was understood that their intention was to operate this service, if possible, in collaboration with Imperial Airways. His Majesty's Government were keeping a close watch on developments in conjunction with Imperial Airways. He added that he was not aware that Pan-American Airways had refused permission for other aircraft to land there.

New Air Lines in the U.S.S.R.

THE first air line to Karelia is shortly to be opened, linking up Petrozavodsk with Ukhta. Preparations are also being made for an air line to connect Berlin with Archangel via Leningrad and Petrozavodsk. Five new civil air lines have been instituted in Western Siberia, with aerodromes and landing fields in the larger towns of the region and at a number of collective and State farms and machine and tractor stations. Among the new lines to be opened in the Ukraine are the Kharkov-Kramatorsk-Lugansk and Kharkov-Kramatorsk-Stalin-Mariupol-Berdiansk lines.

TESTING THE "COURIER": Flt. Lt. Stainforth has carried out all the initial trials. (FLIGHT *Photo.*)

The Airspeed "Courier"

ALTHOUGH the machine has not yet been through its tests at Martlesham, private trials carried out by Flt. Lt. Stainforth have shown that the performance of the Airspeed "Courier" (Armstrong-Siddeley "Lynx") is well above the estimated. At an all-up weight of 3,000 lb., which is not, of course, the full gross weight, but corresponds to the machine with six people on board and all fuel consumed, as at the end of a flight, the speed at 1,000 ft. appears to be 160 m.p.h. When the engine is throttled to 1,900 r.p.m. the cruising speed is approximately 140 m.p.h. It has not been possible to ascertain the stalling speed accurately, but at 3,000 lb. weight the airspeed indicator shows 47 m.p.h. at 1,000 ft. This may be subject to a plus correction, and calculations indicate a stalling speed of about 52 m.p.h.

Still at a loaded weight of 3,000 lb. the initial rate of climb appears to be 1,150-1,200 ft./min. The take-off is good, and the designers may be congratulated on having produced a prototype in which practically no modifications will be required before the "Courier" is put into production. Tail control is reported good right down to the stalling speed, and there is no loss of control due to blanketing. Nor is there any sign of "buffeting." Owing to the somewhat unexpectedly high top speed, the pitch of the Fairey metal airscrew will have to be altered, and as soon as this has been done and a few minor tests completed, the machine will be ready for delivery.

Since our photographs were taken a cowling ring has been fitted, and this has added materially to the speed of the machine. The ring is of large-chord type, and it is

AT AN EARLY STAGE: The Airspeed "Courier" was first tested without the engine cowling. When this was fitted an increase in speed of about 15 m.p.h. was obtained. (FLIGHT *Photo.*)

AN EXTRA 13 M.P.H. : When the undercarriage of the "Courier" is retracted an increase of this order is found. (FLIGHT *Photo.*)

somewhat difficult to decide whether to call it a Townend ring or a N.A.C.A. cowling.

The retractable undercarriage has been found to work well, and tests have indicated that the difference in speed between undercarriage retracted and undercarriage down is 13 m.p.h. As the extra weight is only some 30 lb., this undercarriage seems to be very well worth while.

As a five-seater machine the "Courier," cruising at 140 m.p.h. for a maximum power expenditure of but 48 h.p. per paying passenger, should be a very attractive proposition, and Messrs. Norway and Tiltman are to be congratulated on their work.

A technical description, illustrated by sketches and scale drawings, was published on March 23, 1933.

THE AIRSPEED "COURIER" : In this side view the large petrol tanks of Sir Alan Cobham's special machine can be seen. (FLIGHT *Photo.*)

Klemm Developments

KLEMM AIRCRAFT are, as we have already announced, to be manufactured in this country by British Klemm Aeroplane Co., Ltd. The company, of which Lord Willoughby de Broke will be Chairman, has for its directors Maj. Herbert Musker, Mr. J. H. L. Musker and Maj. E. F. Stephen, the latter being Managing Director. The offices and works are situated at Hanworth aerodrome, Victoria Road, Feltham, Middlesex (Telephone, Feltham 378). An area of over 50,000 sq. ft. has been taken at Hanworth, abutting on the aerodrome. Maj. Stephen, it will be remembered, under the name of S. T. Lea, introduced Klemm aircraft into this country, and the new company through him has acquired the sole manufacturing and selling rights of all Klemm models, both as now existing and of any new designs which may emanate from the German factory, for Great Britain and Ireland and the British Colonies and Dominions. The company will have its own design staff and many improvements are being incorporated in the new machines, including folding wings. It is hoped that the first machine will be ready in June. For a start two models are being produced, one an open two-seater and the second a three-seater, with either open or cabin top. Later there will be a four-seater cabin model. Only British engines will be standardised, and amongst those recommended are the "Pobjoy," British Salmson, "Hermes" and "Gipsy." The company is entirely British, though the services of Director Hans Klemm, the head of the German company, have been retained as technical adviser. Mr. G. H. Handasyde will be works manager. Mr. Handasyde is well known to our readers as being responsible for the range of Martinsyde aircraft, and for the part he played in establishing the "Desoutter" in this country. Klemm aircraft are, of course, widely known and used in this country as well as in the colonies, but the unfavourable rate of exchange has prohibited greater sales of the German-built models. We have often had the pleasure of describing the flying characteristics of new Klemm models, and hope soon to give our readers our experiences with the purely British-built machine.

King's Cup Air Race

INTENDING competitors for the King's Cup Air Race, to be held at Hatfield on July 8, 1933, are reminded that entries close on May 1, 1933, at 5 p.m. Late entries at double entry fee will be received up to 5 p.m. on May 19.

From the Clubs

BROOKLANDS

Brooklands has been a busy place this week, for the good weather and the approach of the holidays combined to get everyone into the air. Three instructors and five machines have proved none too many at times, and there has been activity from dawn until dark. Among those who have been flying regularly are Miss Meakin, Miss Renny-Tailyour and Miss Moodie. Among those who have returned after a winter absence are Messrs. S. W. Slaughter, C. Penn Hughes and F. Telders. Mr. Whitney Straight, the holder of the Mountain Lap record, flew over in a "Puss Moth" during the week. "The Dawn Patrol" is now in full swing, the record for early take-offs being held by Messrs. Frost and Palmer, who in a fit of unholy energy took off at 6.15 a.m. on a visit to Southampton. Last week's joint Dawn Patrol was so successful that it is being organised as a regular event, to take place between Brooklands, Lympne and Sywell. Each week one club will be visited, and it will be up to members to be up and doing to spot the visiting machines before they arrive. If visiting machines can land without being spotted they get a free breakfast, otherwise they pay for it themselves. Brooklands are organising a regular system of patrols and are looking forward to some free eggs and bacon, though a crafty gleam in the eyes of Messrs. Thorn and K. K. Brown suggests that they think otherwise. Brooklands Airways, Ltd., have lately been extremely busy. The week's most interesting trip being one to Le Touquet in the Junkers. The passenger was Maj. Scott, who amused his friends all the way across the Channel by playing tunes on the tin whistle on which he is no mean performer. He now claims a new record, being the first person to tin whistle from England to France.

NORTHAMPTONSHIRE CLUB

The Club has been kept hard at work during the past week with dual instruction and solo flying. Miss Tyzack has completed her blind-flying course and is the first lady member to do so. The blind-flying machine has been sent to Brooklands for a few days, and in its place the Club's old friend IC is being used. Two members have joined and commenced instruction this week. On Sunday, Mr. Allen, of Henly's, again brought up the Avro "Cadet" and everyone was given an opportunity of flying in it. Mr. Thorn caused much amusement by his turns on the aerodrome with the help of wheel brakes, he was also kept busy by those who wished to be flown upside down. On Sunday, April 30, private owners and friends will pay a visit to the Norwich Club, returning the next morning. Another Dawn Patrol is booked for April 23, when members of the Club will make an effort to reach Brooklands unseen, and receive as a reward for their crafty arrival free eggs and bacon. Mr. Thorn is also to be seen nowadays wandering round muttering to himself, devising dark schemes to prevent Brooklands' machines from sneaking into Sywell unseen and enjoying a free breakfast at the Club's expense.

CINQUE PORTS CLUB

The preceding week has seen the departure of ambitious persons out for records, which always arouses great interest among Club members. The first off was Dr. Robiano in his Breda, which had spent some time in the Club hangar, being fitted with a Sperry horizon. The next day Miss Batten left for Australia, and two days later Capt. Lancaster set off to Cape Town. Early morning instruction continues. From the Small Arms School, Hythe, Messrs. Fitzpatrick and Tom Walls, Jnr., secured "A" licences, while Mr. Goldsmid is under instruction. Mr. Allington, who had an hour's dual eight months ago, is now progressing well. Flying hours for the week totalled over 60. Mr. Tony Wilson's Bristol "Fighter" is now nearly ready, and Maj. Parker's "Tomtit" is in operation.

HANWORTH (N.F.S.)

Taking advantage of the good weather, the Club machines put in 21 hr. flying. Cross-country flights were done by Mr. Llewellyn to Shoreham, Lt. Litchfield Speet to Amesbury, Sqd. Ldr. Helmore to Shoreham, Mr. L. S. Chen to Maidstone, Mr. Adinsell to Gloucester and to Farnborough, and Mr. Bramson to Shanklin. The new B.A.C. "Drone" has put in 10 hr. flying during the week, and has been flown by Herr Kronfeld, Lord Carlow, Group Capt. Sydney Smith, Wing Com. Bowman, Flt. Lt. Stainforth, Dr. Gerard Petit, Lt. Oliver, Miss Rendall, and Messrs. Desoutter, Adinsell, Stark, Llewellyn, Beard, Hill, Moore and Pickering. The total week's flying amounted to 102 hours.

NORFOLK AND NORWICH AERO CLUB

The flying hours for the month of March showed a definite increase on those for March of last year, all three machines having been in continual use over the week-ends. Mrs. R. L. Hare and Miss Nancy Bagge are to be congratulated on obtaining their Aero Club certificates and Mr. Alan Colman on passing his cross-country and forced landing tests. The Landing Competition for the

NOT FOR BEGINNERS: Mr. Lowe-Wylde does amazing things on his "Drone." In this remarkable photograph he is seen deliberately touching the grass with a wing tip. The "Drone" makes a new technique in take-off and landing possible. By making very small circles at low speed, the machine can get into and out of quite small fields. (FLIGHT *Photo.*)

Instructors' Cup was won by Mr. A. R. Cox, which was very creditable considering that he has done no flying for the past two or three months. One of the Club's "Moths," G-ABCG, was overhauled for its annual C. of A. The Lloyd's inspector stated it was the best kept machine he had seen, which reflects great credit on Mr. A. Kirby. Visitors during the last month included Dr. G. Gregory, Col. and Mrs. Shelmerdine, Capt. A. M. Diamant, Capt. J. Taylor and Capt. R. R. Bentley. On April 22 the Height Judging Competition will take place, and a party of four or five machines is expected from Northamptonshire Aero Club. The work on the new clubhouse will shortly be completed, and will be opened on June 21, on which date H.R.H. the Prince of Wales has graciously consented to open the new municipal airport at Norwich.

LONDON AEROPLANE CLUB

The sympathies of the Club go to Miss J. Batton, who has had the misfortune to crash in India whilst on her way to New Zealand. Although she was not making any attempt on a record, her time as far as Karachi was very creditable. Mr. A. Bentin, who sails for Peru on Thursday, April 20, has completed his "A" licence tests, and received his certificate from the Air Ministry. After Friday, April 21, suppers will again be served every evening.

SOUTHEND FLYING CLUB

During the week ending April 8 the Club set up a record for the number of hours flown, the total being 26 hr. 45 min., an increase of 50 per cent. on the previous weekly record. Mr. W. A. Ellison and Mr. S. Fey have completed tests for "A" licences.

EASTERN COUNTIES AEROPLANE CLUB

During March 21 hr. 40 min. dual training and 29 hr. 50 min. solo training were carried out. New members number eight flying and five associate. The Club machine at Ipswich airport has been fitted with night-flying equipment, and it is hoped soon to carry out night flying. National Aviation Day, Ltd., and Hospitals Air Pageants are both visiting Ipswich airport and Colchester aerodrome during the summer.

GRAVESEND SCHOOL OF FLYING

The School has been very busy lately, machines being in the air practically all day long. Mr. Fortescue's dual record of 5 hr. 25 min. was nearly beaten by Mr. Mitchell, who went solo after 5 hr. 30 min. The workshops have been kept busy, and an Avro "Avian," Mk. IV, which has been completely rebuilt, is ready for C. of A. There have also been machines and engines coming in from neighbouring clubs. The club-house is now open, and has become very popular in the neighbourhood. Final preparations are being made to cope with the large crowd which is expected for Sir Alan Cobham's Air Circus.

YORKSHIRE AEROPLANE CLUB (N.F.S.)

During the week about 20 hr. were flown at Yeadon and one new member joined, Mr. R. Tinkler. Visitors included Mr. G. Shaw, of Thornaby, and Mr. R. E. Beanlands on his newly-acquired machine.

MAIDSTONE AERO CLUB

The flying members of the Club have taken full advantage of the Easter holidays, and all the machines have been exceptionally busy. On Sunday, April 16, the Club held a Scavenger Hunt, which was an unusual success. On Easter Monday, Sir Alan Cobham's Circus gave a fine entertainment, and throughout the day the Club premises were crowded with visitors and friends. On Sunday, April 23, the Mounted Gymkhana is being held, and all who are interested will be welcome. Entries can be received up to the last minute.

LONDON GLIDING CLUB

The London Gliding Club were soaring continuously throughout the week-end, April 8 and 9, using five machines. A visiting Prüfling was also soared, and two elementary Club machines were used for primary training. The longest flight was 1 hr. 47 min., in the *Crested Wren*; this machine also advanced up-wind for over a mile over flat fields, using for about 10 min. up-currents apparently dissociated from the hillside. She just failed to round Totternhoe Church before having to return to the Club ground. This machine and Miss Lippens's *Professor* made use of the whole ridge from the Bowl to a pine wood well beyond Whipsnade Zoo (5 miles). Four machines were frequently in the air together. Substantial progress is now only being held up by lack of financial resources.

Airport News

CROYDON

ON Tuesday, April 11, Rollason Aviation took delivery of their new Monospar (G-ABUZ), which was intended to be used on the British Hospitals Air Pageants Tour, but at the last minute it was decided to keep the machine at Croydon for pleasure flying over the Easter holiday. Mr. T. Nash, who had been standing by at Croydon for several days waiting to take over the machine from the manufacturers, was rewarded by the constant stream of people who wished to fly in the new 'plane, which caused considerable interest among the visitors at the Airport. It looked very effective in its colour scheme of cream and chocolate. However, before the week was out G-ABUZ came to grief. A mechanic taxying it back to the hangar on Saturday evening collided with a "Moth" belonging to Surrey Flying Services, and crashed into the boundary fence, causing considerable damage, which it is estimated will take six weeks to repair.

Surrey Flying Services had a special charter to Jersey on Thursday, which was carried out by Mr. Hancock in the "Fox Moth," to rush a small tin of cancer medicine back to London. This was urgently needed in an effort to save the life of a patient who was dying in a London nursing home. Mr. Hancock left Jersey at 3.15 p.m. and arrived at Croydon 1 hr. 56 mins. later. The tin containing the medicine was just small enough to be carried in the pilot's waistcoat pocket.

Because his Carnet was not properly filled in Capt. Penny, of B.A.T., was held up in Brussels for six days by the Belgian Customs, who impounded his machine until he paid a duty amounting to £80. When the Belgian authorities released the 'plane on Wednesday, the weather was so bad that he was unable to make the return journey until the following day. Upon his arrival at Croydon on Thursday afternoon, Capt. Penny stated that the Belgian Customs complained of the frequent neglect by British pilots (chiefly from Croydon and Lympne) to fill up the Carnet properly, and they decided to make an example of his case. The £80 duty will be returned to him at a later date.

A large number of "Hermes" engines were shipped abroad on Thursday. The cases bore what appeared to be Chinese characters. The natural assumption is that they are going to China.

Work is continuing at high pressure, and all the workshops remained open throughout the holiday.

Croydon experienced the biggest holiday rush that has ever been known, smashing all previous records. There were more passengers travelling this Easter than at any other holiday. On Thursday no less than 37 air-liners entered and left the Airport. The percentage of passengers being three British to every foreigner. In addition to the regular air line services, there were numerous specially chartered aeroplanes carrying private parties to such places as Le Touquet and the Channel Islands.

Four machines were used to operate the Air Union 4 o'clock service to Paris. M. Carot, a Harley Street physician, and their friends, flew by Air Union service to Corsica, where they are spending the holiday.

Thirty-five air-liners carried holiday makers in and out of Croydon on Friday. The percentage was 2½ British to every alien. One air-liner which left Croydon for Paris in the afternoon carried 28 passengers, 27 of whom were women.

Two new omnibus services were run on Good Friday for the first time, using the Airport for their terminus, one from Finsbury Park and the other from West Wickham. They will only be run on Sundays for the time being, but if the traffic warrants it the services will be extended to week-days, an official of the L.G.O.C. stated.

There were so many visitors to the aerodrome hotel, that 200 teas had to be served on the roof—very nice, too!

Two of the most notable passengers to fly during the holiday were Lord Dawson of Penn, the King's physician, also June, Lady Inverclyde.

The total number of passengers for the week was 1,622. Freight, 65 tons 6 cwt.

HORATIUS

FROM HESTON

EASTER and six days of fine weather has kept Heston Airport really busy during the week ending April 16, promising well for the coming summer.

A general exodus of private and commercial aircraft to the Continent took place on Thursday and Friday, the Customs clearances for those two days numbering 29, making a total of 45 for the week.

Eight new pupils started instruction on the school, among them being Dermot Musker, an Eton boy aged 14, the son of Maj. Musker, a director of the British Klemm Aeroplane Co., who is, of course, learning on a Klemm. B.A.N. Co. flew a distance of 2,887 miles during the week; these flights include fetching the first pictures of the Moscow trial from Berlin and ferrying over 22 passengers to Berck for the week-end. They took delivery of a Percival "Gull" on Thursday, which, flown by Mr. Styran, completed two trips to Berck and back in an average time of 1 hr. 40 min.

On Tuesday, we were pleased to welcome home Mr. A. W. A. Whitehead and Sir Anthony Hope on their Spartan, G-ABHR, who left Heston for Africa on February 10. Their flight was not without incident, engine trouble forcing them to come down in the desert shortly after crossing 360 miles of sea.

On Wednesday, the only wet day, Sir Alan Cobham gave a lunch and short display to representatives of the Press.

On Thursday, there were two new additions to the Heston fleet, a "Fox Moth," G-ABWF, which is intended for Barton Aerodrome, and the *Aeronca*, which has been bought by Mr. Denman to keep us looking on the bright side.

Friday was a 21-hour day for the Airwork staff, as the M.C.C., realising that aerodromes are sometimes useful, started their annual London to Land's End trial from Heston. Four hundred and eight cars left at minute intervals from 9.30 p.m., and the School and restaurant were kept fully employed in flying and feeding the competitors and spectators.

ITALY BEATS SPEED RECORD

AS we announced briefly last week, the Italian pilot, Warrant Officer F. Agello, established a new speed record over the straight-line course by flying his Macchi M.72 monoplane at an average speed of 682.403 km./h. (424 m.p.h.) at Desenzano on April 10, thereby beating (subject to F.A.I. homologation) the British record established by Flt. Lt. Stainforth on Supermarine S.6 (Rolls-Royce "R" engine) of 655 km./h. (407 m.p.h.). Photographs of the Macchi machine and Fiat engine will be found on page 367. The M.72 was designed by Signor Mario Castoldi, and follows what has become normal practice in racing seaplane design, *i.e.*, a wire-braced low-wing twin-float seaplane. The wing is mainly of duralumin construction, and of bi-convex section. The fuselage is of composite construction, with metal front and centre part and wooden rear portion.

The Fiat A.S.6 engine used in the Macchi monoplane consists essentially in two A.S.5 engines joined together end to end, with the reduction gear situated between the two units and a tubular propeller shaft from the rear unit lying in the vee between the front unit cylinders, through whose airscrew shaft it passes. Thus the two shafts are concentrically arranged, and the transmission is such that the two airscrews rotate in opposite directions. One very great advantage of this is that torque reaction is eliminated. This is always a serious item in high-power racing seaplanes, as it causes one float to sink in to quite a considerable extent and tends to cause the machine to swing when the throttle is opened, and before full rudder control is reached. What the effect of the arrangement is on airscrew efficiency we do not know.

The A.S.6 engine is claimed to give approximately 2,900 b.h.p. at 3,200 r.p.m. and the weight is stated to be 930 kg. (2,045 lb.), giving a specific weight of 0.706 lb./h.p. The engine is of more than 50 litres capacity, and a supercharger is situated at the back of the rear unit. Great Britain's share in the new speed record was represented by the Wakefield "Castrol" used for lubricating the engine.

Congratulations

Messages of congratulations were sent to Gen. Balbo by the British Air Minister and by the Royal Aero Club of the United Kingdom. Lord Londonderry's message read: "Hearty congratulations on Warrant Officer Agello's remarkable flight on Macchi-Castoldi seaplane at Lake Garda yesterday. No praise is too high for the courage and determination of the Italian high-speed pilots which have made this achievement possible." In reply Lord Londonderry received the following message from Gen. Balbo: "In recapturing the speed record no congratulations could give me and the Desenzano pilots more pleasure than those of Your Excellency. For six years the contest for high-speed flight has been confined to our countries who, in competing, have combined enthusiasm with the indispensable and sporting spirit. If the Desenzano record were beaten to-morrow over the Solent we Italians should not complain, because our British comrades would offer us a new incentive to beat the record in this rivalry between machines and airmen which marks great progress in human achievement. With cordial thanks, General Balbo."

Warrant Officer F. Agello, who, on April 10, attained an average speed of 682.403 km./h. (424 m.p.h.) on a Macchi M.72 monoplane. **(See page 367.)**

Airisms from the Four Winds

The Long-Distance Flights

MISFORTUNE, serious and otherwise, has followed the path of some of the pilots at present undertaking long-distance flights. Two of them, Dr. L. Robbiano, the Italian pilot who left Lympne on April 8 in his Breda 33 ("Gipsy III") to better the England-Australian record, and Capt. Lancaster, who left Lympne on April 11 to beat Mrs. Mollison's England-Cape record, are both feared lost. After he left Aleppo for Jask on April 9 no news of Dr. Robbiano was received until April 13, when it was reported that he had been forced down near Hindyan, Persia. He eventually reached Karachi, and on April 14 made a non-stop flight to Calcutta in heavy rain. That evening he left for Victoria Point, since when nothing more has been heard of him. It was reported on April 17 that wreckage of an aeroplane, believed to be his, was found near Sandwip Island, off Chittagong, and later another report stated that the body of a European was found by fishermen in the same locality.

Capt. Lancaster succeeded in reaching Oran the same day he left Lympne (April 11), and continuing before dawn next day reached Adrar, whence he proceeded after a brief halt for Gao. Up to the time of writing this was the last heard of him, and search along his route has so far failed to produce any trace of man or machine.

Miss Jean Batten, who is flying home to New Zealand, has also met with misfortune. She reached Aleppo from Athens on April 11, and left later for Baghdad, where she arrived on April 12. On the way to Karachi she made a forced landing some 60 miles from there, and proceeded overland to Karachi, later returning to her machine (which at first was unable to be located). Continuing her flight on April 16 she made another forced landing three miles from Karachi, this time crashing her machine and receiving slight injuries. It was stated that she decided to return to England and make a fresh start.

More fortunate has been the French airwoman, Mlle. Maryse Hilz, who left Le Bourget on April 1 in a Farman 290 for Tokio. After reaching Hanoi, in record time, on April 7, she continued on her way, reaching Hong Kong on April 13, Shanghai on April 14, Seoul on April 15, and Tokio on April 16.

Other long-distance flyers have progressed as follows.—Mrs. Harry Bonney, on her flight from Australia to England, reached Kupang from Port Darwin on April 15, and a 12-hr. flight from Batavia on April 18 brought her to Singapore. Fraulein Elli Beinhorn, the German girl pilot who is flying from Berlin to the Cape, arrived at Nairobi on April 18. Capt. Hans Bertram, the German pilot who is returning from Java to Berlin in his Junkers monoplane, reached Akyab on April 12, Karachi on April 13, and arrived back in Berlin on April 17. He received an enthusiastic welcome.

Schoolboy's Air Trips to Cermany

THIRTY-EIGHT boys and two masters from Wolverhampton School flew from London to Cologne on Monday, April 10. The boys travelled in a Handley Page "Heracles" specially chartered from Imperial Airways, and were spending their Easter holiday on an educational tour of Germany.

Italy's Atlantic Flight

THE date of the departure from Italy of 24 flying boats under the command of General Balbo has been provisionally fixed for May 24. The machines are bound for Chicago by way of Londonderry, where extensive preparations are being made for their reception. They will remain for several days at Lough Foyle, near Londonderry, for refuelling and taking on board stores before proceeding to Iceland. A wireless station is to be erected at Culmore to keep in touch with the machines and supply weather reports. Spare parts for the machines are being carried in the yacht *Amelia*, which is on its way to Londonderry. The machines are expected to arrive at Londonderry on June 2, which will coincide with the visit of seven destroyers belonging to H.M. Fifth Destroyer Flotilla.

"Akron" Inquiry

AT a court of inquiry held on April 11, Lt. Com. Wiley, one of the survivors of the *Akron* disaster, gave his opinion that the airship was caught in a downward air current, and the shock which he had described as a "terrific gust of wind" was in reality the ship breaking in two on hitting the water. Dr. Eckener has expressed his opinion that if a breakage in the framework was responsible for the crash, it occurred where the aeroplanes were stored. He states that he always regarded this spot as dangerous, the airship only being held together there by a "bridge" and not by girders.

Madrid Air Pageant Disasters

THREE accidents, resulting in eight deaths, marred the Air Festival held at Barajas Aerodrome on Saturday, April 15, to celebrate the second anniversary of the Republic. During a ballooning exhibition, Lt. Robert, one of Spain's best-known airmen, rammed a balloon. An explosion followed, resulting in the death of Lt. Robert and the other airman. Two aeroplanes also collided over the Spanish Mint. One pilot was killed, but the other escaped by parachute. One of these machines crashed on to a roof and burst into flames, seriously injuring four women, three of whom died in hospital. Another machine piloted by Maurice Berthelot, accompanied by a young female friend, also crashed, both occupants being killed.

London—Melbourne Race

SIR MACPHERSON ROBERTSON, the Australian business man, has offered an additional £5,000 for prize money for an air race from London to Melbourne, to which we have already referred, to take place in October, 1934. The total prize money, therefore, is now £15,000.

International Air Races

BRITISH INTERNATIONAL AIR RACES, LTD., have now had approved, by the Portsmouth City Council, their scheme for holding a race meeting at Portsmouth on August 4, 6 and 7. The recommendation was adopted without discussion, Portsmouth getting 10 per cent. of the profits. Details of the scheme were published last week.

The "Morning Post" Race

THE cross-country race which has been promoted by the *Morning Post* will start and finish from Heston Airport on Monday, June 5. The secretary of the race is Mr. R. P. Denman, of Airwork, Ltd., Heston, and all inquiries should be addressed to him The race will be held under the competition rules of the Royal Aero Club, and the regulations of the F.A.I. It will be a handicap cross-country race, with a special time allowance for competitors who have less than 250 hr., 100 hr., or 50 hr. piloting experience, the allowance being 5 min., 10 min., and 15 min. respectively. The itinerary of the race will be divulged to competitors by stages as the race progresses. It will be over a course of approximately 500 miles, with two or more controls, having turning points between them, the distance between stops not exceeding 180 miles. Competitors will be required to land at each control and wait 50 min. before proceeding on the next lap. The race is open to all pilots of British nationality or those who have been domiciled in the British Isles for at least five years. Any type of *bona-fide* civil aircraft may be flown. Passengers may not be carried. The entrance fee for each aircraft will be £3 3s. Competing aircraft must be at Heston Airport by 6 p.m. on June 4. Entries will close at 5 p.m. on May 15, or at double fee up to 5 p.m. on May 22, or at treble fee up to 5 p.m. on May 25. Repairs and replacements are allowed. Country houses are being used as the turning points, and it is encouraging to know that an enormous number of replies have been received in response to requests for assistance from those owning houses in the area of the race. This is an encouraging sign of the interest which people are taking in flying.

An S.B.A.C. Display this Year

FOLLOWING upon the success achieved last year, the Society of British Aircraft Constructors has decided again this year to hold a display at Hendon. Monday after the Royal Air Force Display has been chosen as the most suitable date, and the proceedings will consist partly of a ground inspection, followed by a flying display, and partly of an immobile exhibition housed on the aerodrome. It should be pointed out, in order to prevent disappointment later, that the display is confined to members of the S.B.A.C. only, and that therefore such firms as desire to exhibit, and which are not already members, must apply without delay to the society's offices at 1, Albemarle Street, London, for particulars of membership, etc.

THE ROYAL AIR FORCE

London Gazette, April 11, 1933.

General Duties Branch

The following are granted permanent commns. as Pilot Officers with effect from March 20, and with seny. of the dates stated :—A. H. Allen (March 20, 1932) ; L. W. Burgess (Sept. 20, 1931).

J. P. Selby is granted a short service commn. as Acting Pilot Officer on probation with effect from March 29, and with seny. of March 24. Pilot Officer on probation A. D. Isemonger is confirmed in rank (March 11). The following Acting Pilot Officers on probation are confirmed in rank and graded as Pilot Officers (April 1) :—W. D. Anderson, A. J. Biggar, H. D. U. Denison, C. Griffiths, A. J. D. Harding, J. H. Hill, N. Hope, E. M. Lewis, D. P. M'Keown, J. H. R. Oldfield, A. S. Q. Robins, C. M. Stewart.

Flight Lt. C. O. Towler, D.S.M., is placed on retired list (April 11).

Medical Branch

The following are granted short service commns. as Flying Officers for three years on the active list with effect from March 27, and with seny. of the dates stated :—W. Hall, M.R.C.S., L.R.C.P., M.B., Ch.B. (March 27, 1932) ; J. McGovern, M.B., B.Ch. (May 29), 1932.

ROYAL AIR FORCE RESERVE
RESERVE OF AIR FORCE OFFICERS

General Duties Branch

Pilot Officer on probation D. G. Ross is confirmed in rank (March 11) Sqdn. Ldr. H. G. Brackley, D.S.O., D.S.C., is transferred from Class A to Class C (April 8) ; Flt. Lt. G. Rose relinquishes his commn. on completion of service and is permitted to retain his rank (April 7).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified :—

General Duties Branch

Wing Commander P. Huskinson, M.C. to H.Q., Wessex Bombing Area, Andover, 1.4.33, for Armament duties *vice* S. Ldr. E. B. Grenfell, A.F.C.

Squadron Leaders : S. D. Culley, D.S.O. to No. 39 (B) Sqdn., Risalpur, India, 14.3.22, to command *vice* S/Ldr. S. B. Harris, D.F.C., A.F.C. W. K. Mercer to H.Q., Air Defence of Gt. Britain, Uxbridge, 6.4.33, for personnel Staff duties *vice* S/Ldr. H. E. P. Wigglesworth, D.S.C., V. R. Scriven, A.F.C., to H.Q., Wessex Bombing Area, Andover, 6.4.33, for Engineer Staff duties *vice* S/Ldr. P. E. Gwyer, M.B.E.

Flight Lieutenants : G. I. L. Saye, to No. 201 (F.B.) Sqdn., Calshot, 5.4.33. S. R. Ubee, to Experimental Section, Rl. Aircraft Estabt., Farnborough, 4.4.33. J. H. Winch, to H.M.S. *Eagle*, 2.4.33.

Flight Lieutenants : M. B. Mackay, to No. 11 (B) Sqdn., Risalpur, India, 12.3.33. M. C. Pascoe, to Record Office, Ruislip, 23.3.33.

Flying Officers : R. T. S. Morris, to No. 3 Armament Training Camp, Sutton Bridge, 20.3.33. R. A. Sprague to R.A.F. College, Cranwell, 3.4.33. H. R. A. Edwards, to No. 600 (City of London) (B) Sqdn., Hendon, 5.4.33. C. E. J. Baines, to No. 209 (F.B.) Sqdn., Mount Batten, 19.3.33. R. B. Brown, to No. 209 (F.B.) Sqdn., Mount Batten, 19.3.33. J. A. C. Forbes, to No. 210 (F.B.) Sqdn., Pembroke Dock, 19.3.33. J. G. G. Moore, to No. 204 (F.B.) Sqdn., Mount Batten, 19.3.33. F. R. Newell, to No. 204 (F.B.) Sqdn., Mount Batten, 19.3.33. B. S. Nicholl, to No. 204 (F.B.) Sqdn., Mount Batten, 19.3.33. A. Threapleton, to No. 55 (B) Sqdn. Hinaidi, Iraq, 22.3.33.

Pilot Officers : H. G. Lee, to No. 33 (B) Sqdn., Bicester, 31.3.33. J. G. Bigelow, to No. 2 Flying Training School, Digby, 21.3.33. A. N. Combe, to No. 201 (F.B.) Sqdn., Calshot, 19.3.33. D. I. Coote, to No. 201 (F.B.) Sqdn., Calshot, 19.3.33. A. Franklin, to No. 84 (B) Sqdn., Shaibah, Iraq, 20.3.33. S. F. Godden, to No. 2 Flying Training School, Digby, 21.3.33. D. Michell to No. 201 (F.B.) Sqdn., Calshot, 19.3.33. N. H. J. Tindal, to No. 2 Flying Training School, Digby, 21.3.33. E. G. Villiers, to No. 2 Flying Training School, Digby, 21.3.33.

Acting Pilot Officer J. P. Selby, to R.A.F. Depot, Uxbridge, 29.3.33, on appointment to short service commn.

Stores Branch

Flight Lieutenant R. M. Taylor, M.C., to Aircraft Depot, Iraq, Hinaidi, 1.4.33.

Accountant Branch

Flight Lieutenant E. W. Horncastle, to H.Q., Coastal Area, Lee-on-Solent, 4.4.33.

Flying Officer W. M. Lyons, to Station H.Q., Netheravon, 2.4.33.

Medical Branch

Flight Lieutenant J. F. McGovern, to R.A.F. Depot, Uxbridge, 1.4.33.

Flying Officers : L. M. Corbet, to No. 5 Flying Training School, Sealand, 3.4.33. W. Hall and J. McGovern, to Medical Training Depot., Halton, 27.3.33, on appointment to short service commns. R. K. Muir, to R.A.F. General Hospital, Hinaidi, 9.3.33. A. H. Osmond, to Central Flying School, Wittering, 3.4.33.

NAVAL APPOINTMENT

The following appointment has been made by the Admiralty :—

ROYAL AIR FORCE

Flight Lieutenant J. H. Winch, to *Eagle* (April 2).

R.A.F. Specialist Officers. New Class Instituted

THE Air Council have reviewed the sources of supply of specialist engineer officers and have concluded that the policy of filling a proportion of posts by men who have had extensive practical experience of engineering duties as airmen can with advantage be carried further. By this means the element of long practical experience in service engineering will be strengthened and the career open to airmen will be improved. The principal source of engineer officers will continue to be officers of the general duties branch who specialise in that subject, but a smaller number of such will be required, and this will allow of a better balance between the numbers required to specialise in engineering and the numbers required to specialise in other subjects.

It is contemplated that about 60 per cent. of the existing officer engineer posts will be filled by general duties branch specialists. Of the balance of 40 per cent., a small number will be downgraded to warrant officer and filled by W.Os. " E " ; the great majority, however, will be filled by a new class of officer promoted to the rank of flying officer from W.O. " E." Officers so commissioned will not normally be pilots, and will not, therefore, be included in the general duties branch ; they will form a new class to be known as " commissioned engineer officers." They will be available for appointment equally with flight lieutenants of the general duties branch who are " E " specialists to flight lieutenant " E " posts for which their qualifications make them suitable.

A similar policy will be followed as regards Signals and Armament, but to a more limited degree. Officers commissioned from W.O. " S " or W.O. " A " will be known as " commissioned signals officers " and " commissioned armament officers," respectively, and will be available equally with specialist flight lieutenants " S " or " A " for appointment to flight lieutenant " S " or " A " posts for which their qualifications make them suitable.

Permanent commissions in the Royal Air Force up to the following normal annual maxima may be granted to warrant officers who are recommended by air or other officers commanding as being in every respect likely to make efficient specialist officers.

Commissioned engineer officers		7.
,,	signals officers ..	1 or 2 (to be decided later).
,,	armament officers	1.

Warrant officers of the following trades only will be eligible for selection :—

For commissioned engineer officer	..	warrant officer engineer.
,, ,,	signals officer ..	warrant officer signals.
,, ,,	armament officer	warrant officer armament.

In future, warrant officers of these trades will not be eligible for appointment to commissioned rank in the stores branch.

Warrant officers finally selected will be discharged from their engagements, gazetted to permanent commissions as flying officers on probation, and will take seniority from date of appointment to a commission. On satisfactory completion of a probationary period of 12 months, they will be confirmed in rank.

The following are the rates of pay issuable to these officers :—

	Standard. £ s. d.	*Current.* £ s. d.
Flying officer	1 1 0	0 18 8
Flight lieutenant	1 3 0	1 0 6
,, ,, after 4 years in substantive rank	1 5 0	1 2 4

Promotion to the rank of flight lieutenant will be by selection within an establishment approved by the Air Ministry. An outfit allowance of £50 will be issuable on appointment and a further £50 on confirmation.

Officers appointed under this scheme will be compulsorily retired at the age of 50, irrespective of rank, and on retirement will be eligible for retired pay calculated at the rate of £10 for each year of reckonable service up to 15 years and £15 for each subsequent year, subject to a maximum of £300 a year. Reckonable service will include qualifying service as a warrant officer, class I, and half such service after age 18 in lower ranks. These rates are standard rates and are subject to revision.

Warrant officers who at the date of this order have been appointed to commissions in the stores branch will, if they so desire, be considered for transfer to commissions under this scheme.

Royal Aeronautical Society : New Council

THE new Council of the Royal Aeronautical Society for 1933-34 is as follows. (Those starred are newly elected or re-elected) :—

President.—Mr. C. R. Fairey, M.B.E., F.R.Ae.S.

Past-President.—Col. the Master of Sempill, A.F.C., F.R.Ae.S.

Vice-Presidents.—Prof. L. Bairstow, C.B.E., F.R.S., F.R.Ae.S. ; Air Marshal Sir H. R. M. Brooke-Popham, K.C.B., C.M.G., D.S.O., A.F.C., F.R.Ae.S.

Council.—*Capt. P. D. Acland, *Maj. J. S. Buchanan, O.B.E., A.M.I.Mech.E., F.R.Ae.S., Maj. G. P. Bulman, O.B.E., B.Sc., F.R.Ae.S., Mr. R. S. Capon, O.B.E., B.A., F.R.Ae.S., Mr. E. C. Gordon England, F.R.Ae.S., Mr. W. S. Farren, M.B.E., F.R.Ae.S., M.I.Ae.E., *Mr. A. H. Hall, C.B.E., M.Inst.C.E., M.I.Mech.E., F.R.Ae.S., *Capt. A. G. Lamplugh, F.R.G.S., F.R.Ae.S., *Mr. M. Langley, A.M.I.Ae.E., A.M.Inst.N.A., *Maj. R. H. Mayo, O.B.E., M.A., A.M.Inst.C.E., F.R.Ae.S., Mr. R. K. Pierson, M.B.E., B.Sc., Assoc.M.Inst.C.E., F.R.Ae.S., Mr. D. R. Pye, M.A., F.R.Ae.S., Mr. E. F. Relf, A.R.C.S., F.R.Ae.S.., *Lt. Col. F. C. Shelmerdine, C.I.E., O.B.E., A.F.R.Ae.S., *Sir J. D. Siddeley, C.B.E., F.R.Ae.S., *Mr. F. Sigrist, M.B.E., F.R.Ae.S., *Mr. O. E. Simmonds, M.A., M.P., F.R.Ae.S., Prof. R. V. Southwell, M.A., F.R.S., F.R.Ae.S.

Hon. Treasurer.—Maj. D. H. Kennedy, O.B.E., F.R.Ae.S.

Hon. Solicitor.—Mr. Lawrence A. Wingfield, M.C., D.F.C., A.R.Ae.S.I.

Hon. Librarian.—Mr. J. E. Hodgson.

Hon. Accountant.—Mr. A. N. D. Smith, F.C.A.

AIR SERVICE TRAINING ACTIVITIES

MARCH was a very busy month for all at Air Service Training at Hamble. The training of the R.A.F. Reserve, under the new scheme, commenced with the arrival on the 20th of the month of a number of *ab initio* pilot officers, whose initial training consists in a fortnight's intensive ground course covering the subjects of Airmanship, Air Pilotage, Rigging, Engines, Theory of Flight and Parachutes, and is followed by flying training and further Ground Instruction in the above subjects, and also in Air Gunnery and Air Photography.

The pupils of the first Wireless Course, which is shortly finishing, have been gaining the very necessary air experience as operators in the School's wireless-equipped aircraft. The apparatus in use is the Marconi AD6M transmitting and receiving type, which is the standard apparatus for use in commercial aircraft, and that on which candidates for the P.M.G.'s licence are examined.

Among the other pupils, Mr. Burbidge, a Canadian, completed his aerobatic course, while Mr. Torsten Scheutz arrived from Sweden for a course in advanced flying, and Mr. Gazdar returned from India to complete his training.

The staff of the School has been increased by the appointment of Mr. Ford, who is in charge of Armament and Air Gunnery, and Mr. McKenzie in charge of all the photographic courses. Mr. Ford, who was previously on the Central Trade Test Board of the R.A.F. at West Drayton, is a member of the executive committee of the R.A.F. Rifle Association, and is a well-known Bisley rifle and revolver shot. Mr. McKenzie left the Service in 1928 and has since been engaged in Air Photography and Survey work in England and Africa.

Among other items of interest were the visit of the Prince and Princess of Wurtemburg, who were shown over the School buildings, squash matches against the R.A.F., Andover, and against Mr. Owen's team, and the entertaining of Sir Alliott Verdon Roe at the Monthly Guest Night.

Air Service Training, Ltd., which is a subsidiary company of Armstrong-Siddeley Development Co., have now passed through their experimental stage, and can be reckoned to have a very definite influence on British civil aviation. The idea of this training centre is to provide an "Air University" which can supply to civilians a standard of training hitherto only obtainable in the Royal Air Force. Employing about 20 flying and ground instructors, A.S.T. possess 27 aircraft of nine different types. Pupils can be trained for any type of Air Ministry licence, and instruction is given in all types of flying and ground subjects. The school is situated among idyllic surroundings at the meeting of the river Hamble with Southampton Water. There is probably no spot in Great Britain where such a high average of flying hours can be kept up.

* * * *

BLACKPOOL AND WEST COAST AIR SERVICES, LTD.

The above new company has been formed by Mr. J. C. Higgins, who for the last two years has been acting as instructor to the Liverpool Aero Club, Mr. Barker, and Mr. T. Jones. The intention and aim of the company is to cater for instructional and taxi work, pleasure flying, and night flying during the Blackpool Illuminations. The machines used will include "Gipsy Majors," "Fox Moths," and Avro "Avians." Squires Gate aerodrome, from where the company will operate, is one of the largest in the kingdom, is very accessible and ideally situated. Petrol and oil are available and no landing fee will be charged.

JOINTING COMPOSITIONS

IT is absolutely necessary that certain jointings in aircraft must be waterproof, airtight and gasproof. Such joints as cylinder heads, sump joints, inlet and exhaust manifolds, petrol and oil tanks and pipes, hulls of flying-boats and floats of seaplanes. The joints in themselves are not foolproof and so a composite mixture must be applied. Heldite is well known for it has been used on aircraft joints for many years and is approved by the Air Ministry for use in engines and aircraft. It is unaffected by petrol, oil, gas, or even such solvents as sulphur dioxide. Its plastic qualities render it immune to the effects of vibration, expansion and contraction. Practically all the principal aircraft manufacturers and aircraft-engine manufacturers use Heldite, and have done so for some time. It was used in the construction of the Schneider Trophy winner, Malcolm Campbell's "Bluebird" and the speed boat *Miss England*. Further information regarding Heldite may be obtained from The Held Glue & Compounds Co., Ltd., Boar's Head Wharf, Brentford, Mdx.

Change of Address

THE British Aluminium Co., Ltd., Adelaide House, King William Street, London, E.C.4, have removed from their Birmingham office and warehouse at 21, Berwick Street, to Lawley and Landor Streets. The new telephone number is Aston Cross 5865-6.

Universal Aircraft Services, Ltd.

WE regret that an error crept into the advertisement of the above firm on page xxxvii of our last issue, where "Supplies" was printed instead of "Services" in the name and address. This should, therefore, read "Universal Aircraft Services, Ltd., Witney, Oxon."

* * * *

IMPORTS AND EXPORTS

AEROPLANES, airships, balloons and parts thereof (not shown separately before 1910).

For 1910 and 1911 figures see FLIGHT for January 25, 1912.
For 1912 and 1913, see FLIGHT for January 17, 1914.
For 1914, see FLIGHT for January 15, 1915, and so on, yearly, the figures for 1932 being given in FLIGHT, January 19, 1933.

	Imports		Exports		Re-exports	
	1932.	1933.	1932.	1933.	1932.	1933
	£	£	£	£	£	£
Jan. ..	2,456	2,073	122,942	82,963	863	827
Feb. ..	2,503	9,866	181,482	79,357	90	3,050
Mar. ..	1,946	3,760	167,195	126,008	200	821
	6,905	15,724	471,619	288,328	1,153	4,698

* * * *

PUBLICATIONS RECEIVED

U.S. National Advisory Committee for Aeronautics Technical Notes: No. 441. *Rolling, Yawing, and Hinge Moments Produced by Rectangular Ailerons.* By R. H. Heald. Jan., 1933. No. 442. *Jet Propulsion with Special Reference to Thrust Augmentors.* By G. B. Schubauer. Jan., 1933. No. 443. *Wind-Tunnel Research Comparing Lateral Control Devices, Particularly at High Angles of Attack: VII. Handley Page Tip and Full-Span Slots with Ailerons and Spoilers.* By F. E. Weick and C. J. Wenzinger. Jan., 1933. No. 444. *Working Charts for the Stress Analysis of Elliptic Rings.* By W. F. Burke. Jan., 1933. No. 445. *Wind-Tunnel Research Comparing Lateral Control Devices, Particularly at High Angles of Attack: VIII. Straight and Skewed Ailerons on Wings with Rounded Tips.* By F. E. Weick and J. A. Shortal. Feb., 1933. No. 446. *Estimation of the Variation of Thrust Horse-power with Air Speed.* By S. Ober. Feb., 1933. No. 447. *The Effect of Lift, Drag, and Spinning Characteristics of Sharp Leading Edges on Airplane Wings.* By F. E. Weick and N. F. Scudder. Feb., 1933. No. 448. *Effect of Aileron Displacement on Wing Characteristics.* By R. H. Heald. Feb., 1933. No. 449. *Wind-Tunnel Research Comparing Lateral Control Devices, Particularly at High Angles of Attack: IX. Tapered Wings with Ordinary Ailerons.* Feb., 1933. Errata for Technical Report No. 410. *Theory of Wind Tunnel Wall Interference.* U.S. National Advisory Committee for Aeronautics, Washington, D.C., U.S.A.

Handbuch fur Lufttouristik: Clubbuch des Aero-Clubs von Deutschland. 1933. Aero-Club von Deutschland, Blumeshof, 17, Berlin, W.35.

* * * *

NEW COMPANIES REGISTERED

VICTOR OIL ENGINES (COVENTRY), LTD.—Capital £3,000, in £1 shares. Manufacturers of, and dealers in, motor cycles, motor cars, aeroplanes, hydroplanes, etc. Directors: Geo. M. Hamilton-Fletcher, Studland Manor, Swanage, Dorset, gentleman; Wm. A. Weaver, "Mayville," St. George's Road, Coventry, engineer.

RAYGAN, LTD.—Capital £500, in £1 shares. Manufacturers and importers of, and dealers in, model aeroplanes, novelties, goods, etc. Directors: Frank Thackray, "Franklyn," Eastwood Lane, Leigh-on-Sea; Fredk. J. Morgan, 1127, London Road, Leigh-on-Sea. Solicitors: F. N. Ball, 105, Leigh Road, Leigh-on-Sea.

W. DAVID SMITH & CO., LTD., 76, High Street, West Bromwich. Capital: £1,000 in £1 shares. Motor body builders, aeroplane, motor, motor-cycle, etc., builders, makers of aeroplanes, parts, etc. Directors: Wm. D. Smith, 16, Holly Road, Handsworth, Birmingham. Mary Smith, 47, Portland Street, Aberystwyth.

* * * *

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: Cyl. = cylinder; i.c. = internal combustion; m. = motors. (The numbers in brackets are those under which the Specifications will be printed and abridged, etc.)

APPLIED FOR IN 1931

Published April 20, 1933

18,131. H. C. FORD, J. M. BALLOU, A. A. MERRILL, V. W. BALZER and MERRILL AIRCRAFT CO. Aeroplane control. (389,845.)

26,827. H. R. RICARDO. I.c. engines of the liquid-fuel injection compression ignition type. (389,862.)

26,828. H. R. RICARDO. I.c. engines of the liquid-fuel injection compression ignition type. (389,863.)

26,829. H. R. RICARDO. I.c. engines of the liquid-fuel injection compression ignition type. (389,864.)

32,391. R. H. UPSON. Indicating-instrument for use on aircraft. (389,911.)

APPLIED FOR IN 1932

Published April 13, 1933

6,362. C. L. FLORISSON and SOC. DE CONDENSATION ET D'APPLICATION, MECANIQUES. Echo-sounding apparatus for use on noisy aircraft. (389,646.)

20,647. A. ABRAMSON. Cylinder for two-stroke i.c. engine. (389,716.)

Published April 20, 1933

6,321. F. VON OPEL. Apparatus for actuating the controls of aircraft. (389,977.)

22,686. SPERRY GYROSCOPE CO. INC. Hand electric steering-gear for dirigible crafts. (390,051.)

ouse,
from
rwick
phone

ement
where
n the
read

(not

1912.

early,
1933.
orts
1933
£
827
3,050
821

4,698

: No.
lerons.
Specia.
No. 448
arly at
ts with
, 1933.
W. F.
Lateral
ght and
d J. A.
Thrust
. The
dget on
No. 448.
Heald,
Control
gs with
o. 419.
y Com-
ckland,

, in (1
oplanes,
Manor,
George's

rs and
rectors:
edk. J.
ll, 165,

nwich.
motor,
rectors:
Smith,

ONS
motors.
will

ER and
ression
n com-
pression
39,911.)

CATION,
isy air-
16.)
aircraft.
ear for